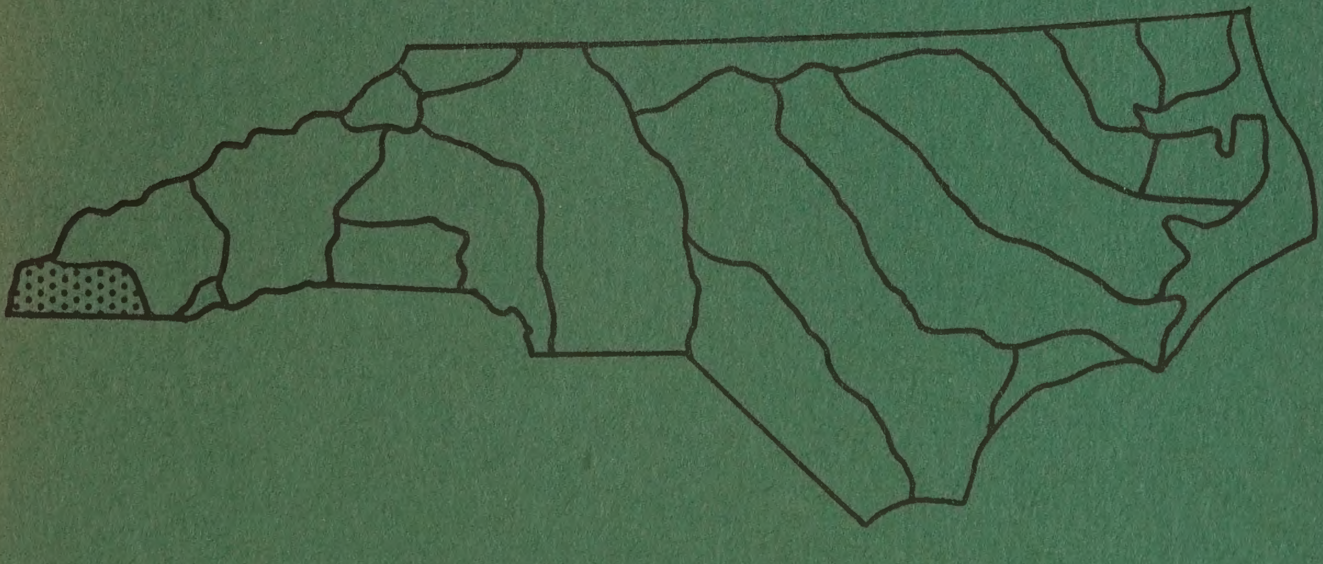
HIWASSEE RIVER BASIN

POLLUTION SURVEY REPORT

1960



NORTH CAROLINA
STATE STREAM SANITATION COMMITTEE

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STATE DEPARTMENT OF WATER RESOURCES
DIVISION OF STREAM SANITATION AND HYDROLOGY
RALEIGH

POLLUTION SURVEY
REPORT NO 10

THE HIWASSEE RIVER BASIN

A study of existing pollution in the Hiwassee River Basin together with recommended classifications of its waters.

1958

STATE STREAM SANITATION COMMITTEE

NORTH CAROLINA STATE DEPARTMENT OF WATER RESOURCES
DIVISION OF STREAM SANITATION & HYDROLOGY
RALEIGH, NORTH CAROLINA

CONTENTS

INTRODUCTION

A survey of the surface waters of the Hiwassee River Basin was made and this report has been prepared to fulfill the requirements of Section 143-215 of Article 21 of the General Statutes of North Carolina. The area covered by these studies and considered in this report is that portion of the Hiwassee River watershed which lies in the State of North Carolina. The area included is shown on the accompanying map entitled "Hiwassee River Basin".

The data on which this report is based have been developed through actual laboratory studies of existing stream conditions, engineering surveys of municipal and industrial water supplies and waste treatment facilities, from information obtained from existing files, conferences with persons well acquainted with the area, and visits to the sites under study. Data covering stream flow and drainage areas were furnished by the North Carolina District Office, Geological Survey of the United States Department of Interior, under terms of a cooperative agreement between that Office and the State Stream Sanitation Committee. Other Federal, as well as State, County, and Municipal agencies have been of considerable assistance in furnishing data regarding land and stream uses.

The laboratory studies in the Hiwassee River Basin were begun in July, 1958, with the laboratory based in Bryson City, and concluded in September of the same year, following which the data herein were compiled.

This report presents information about stream conditions, usage of water resources in the area, sources from which pollution is discharged into these waters, and pollution prevention measures prevailing during the period of study, together with recommended classifications for the waters of the Basin.

During these studies and the preparation of this report, a sincere effort has been made to present a true picture of the water pollution problems in the Basin. Likewise, a conscientious effort has been made toward developing reasonable conclusions and recommendations pertaining to the recommended classifications of the various waters of the area included within this report. It is hoped that this report will be useful to all concerned with the problem of safeguarding the water resources of the Hiwassee River Basin.

INTRODUCTION

A survey of the surface waters of the Roanoke River Basin and this report have been prepared to fulfill the requirements of Section 143-215 of Article 21 of the General Statutes of North Carolina. The area covered by these studies and considered in this report is that portion of the Roanoke River watershed which lies in the State of North Carolina. The area included is shown on the accompanying map entitled "Roanoke River Basin".

The data on which this report is based have been developed through actual laboratory studies of existing stream conditions, reconnaissance surveys of municipal and industrial water supplies and waste treatment facilities, from information obtained from existing files, conferences with persons well acquainted with the area, and visits to the sites under study. Data covering stream flow and drainage areas were furnished by the North Carolina District Office, Geological Survey of the United States Department of Interior, under terms of a cooperative agreement between that Office and the State Stream Sanitation Committee. Other Federal, as well as State, County, and Municipal agencies have been of considerable assistance in furnishing data regarding land and stream uses.

The laboratory studies in the Roanoke River Basin were begun in July, 1958, with the laboratory based in [illegible], and concluded in September of the same year, following which the data herein were compiled.

This report presents information about stream conditions, usage of water resources in the area, sources from which pollution is discharged into these waters, and pollution prevention measures prevailing during the period of study, together with recommended classifications for the waters of the Basin.

During these studies and the preparation of this report, a concerted effort has been made to present a true picture of the water pollution problems in the Basin. Likewise, a conscientious effort has been made toward developing reasonable conclusions and recommendations pertaining to the recommended classifications of the surface waters of the area included within this report. It is hoped that this report will be useful to all concerned with the problem of safeguarding the water resources of the Roanoke River Basin.

ACKNOWLEDGMENT

The valuable cooperation and assistance of those agencies and individuals which have contributed to the study of the Hiwassee River Basin and to the preparation of this report are gratefully acknowledged.

Special recognition is given to the officials of industries and municipalities throughout the Basin who furnished data relative to plant operation, waste discharges, and treatment facilities employed. Recognition is also given to the Laboratory of Hygiene of the State Board of Health at Raleigh; Mr. Ray of Ray's Esso Service Station at Bryson City for furnishing space for the mobile laboratory unit; the Board of County Commissioners of Swain County and Swain County Health Department for furnishing power; and Mr. James Myers for supplying water for the operation of the laboratory.

Federal, State, and private agencies from which cooperation and assistance were obtained include the Geological Survey; the Forest Service and the National Park Service of the United States Department of Interior; the United States Department of Agriculture, Soil Conservation Service; the Tennessee Valley Authority; the North Carolina Wildlife Resources Commission; the North Carolina Department of Conservation and Development, Commerce and Industry Division; and the State Board of Health. Assistance was also rendered by the District Health Department; the County Departments of Agriculture; and other agencies and individuals interested in preserving and developing our water resources. Their assistance is hereby acknowledged.

SUMMARY

This report has been prepared to fulfill the requirements of Section 143-215 of Article 21 of the General Statutes of North Carolina.

The area covered by this report, encompassing approximately 656 square miles, is the Hiwassee River Basin which includes all of that portion of the Hiwassee River Watershed lying within the State of North Carolina. The Basin lies between the Little Tennessee River Basin on the North and East, the North Carolina-Georgia State Line on the South, and the North Carolina-Tennessee State Line on the West. The estimated population within the Basin in 1950 was 24,000.

Water uses in the Basin include domestic water supplies; bathing and other forms of recreation; fish and wildlife propagation; agriculture (stock watering); electric power production; disposal of sewage; and navigation by small craft.

There are within the Basin three public and semi-public surface water supplies serving a maximum estimated population of 4,470 with about 0.535 MGD. In addition, three public and semi-public ground water supplies from wells and springs serve a maximum population of 705 with approximately 69,000 GPD. The 17 schools in the Basin use water from wells or from municipal systems for domestic purposes, while the one prison camp secures domestic water from a well. Three hydroelectric power installations use water from man-made lakes or reservoirs for generating power at the rate of 3,610 MGD. Apalachia Lake, which lies on Hiwassee River in North Carolina, supplies water to a hydroelectric powerhouse in Tennessee in order to assure utilization of the maximum head.

The survey did not disclose any industrial waste other than that normally found in municipal sewage collection systems. There are only four significant sources of pollution within the Basin, counting all discharges of sewage from a given area through multiple outfalls as one source. The schools, except two connected to municipal sewerage systems and one using pit privies, and the one prison camp discharge sewage and kitchen waste to well-operated secondary type treatment plants which are presently satisfactory. The four significant sources of Pollution have an estimated maximum average flow of 0.49 MGD, a P.E. of 4,750 before treatment and a P.E. of 4,675 after treatment, which represents an overall reduction of pollution reaching the receiving waters of but two percent. Those responsible for the four significant sources of pollution operate five sewage treatment facilities of which, only one is considered to provide satisfactory treatment.

A review of the analytical data for samples of water collected from streams below hydroelectric power installations in this Basin shows that the water withdrawn from low-level intakes for generating power, as for other similar installations, is low in dissolved oxygen when the deeper lakes are stratified.

The water in Hiwassee River at Sampling Station No. 101, located 1,100 feet below Chatuge Dam, contained a minimum dissolved oxygen content of 2.3 ppm during the period of the 1958 stream studies even though the river above the dam does not receive sewage or industrial waste of any significance. The river below the dam to the vicinity of Mission Lake is swift and turbulent. As a result, the water at Sampling Station No. 104, located 4.4 miles below the dam, contained a minimum of 4.2 ppm dissolved oxygen in spite of the pollution from the Hayesville Area. The water in Mission Lake, formed by Andrews Dam 14.9 miles below Chatuge Dam, contained a minimum dissolved oxygen content of 7.1 ppm. There was little change in the dissolved oxygen of the water discharged through the tailrace.

The water withdrawn at the 20-foot level at Hiwassee Dam, Sampling Station No. 118, contained a minimum dissolved oxygen content of 7.3 ppm, while at Sampling Stations Nos. 119 and 120 in Apalachia Lake, located 100 and 1,100 feet respectively, below this dam, the water from the low-level intake after slight aeration had a minimum dissolved oxygen content of 5.4 ppm on September 24, 1958, when the last samples were collected for the season. It is not known if the dissolved oxygen was reduced further after this date, although there had been a gradual reduction at the downstream stations after the first samples were collected on July 28 of that year. While no samples were collected in 1958 in Apalachia Lake at Apalachia Dam, the Tennessee Valley Authority found from studies conducted on June 29, 1955, as explained under Segment IX, that the water flowed through this small lake as a density underflow in the warm months of the year with little change in dissolved oxygen concentrations, although they were higher at the dam. These findings suggest that any pollution discharged to this lake should be treated to the degree that the effluent will not cause any appreciable deterioration in water quality.

It should be noted that no fish kills have been reported in Hiwassee River below these power installations nor in the North Carolina portion of Nottlely River below the Nottlely Dam in Georgia from which water of similar character to that below Chatuge Dam is discharged.

CONCLUSIONS

The waters of the Hiwassee River Basin, except as developed for the generation of hydroelectric power, have not as yet been utilized to their fullest capability. Nevertheless, they are essential to the daily well being of man in many ways and to the preservation of animal life. These benefits are, however, contingent upon an abundance of clean water. While these waters are relatively free from pollution, the following conclusions, based upon a careful review of this report, indicate that their full potential cannot be realized until corrective action is taken by those responsible for the discharge of pollution:

1. The production of pulpwood and other timber products and agricultural pursuits rank high in the economy of the area. Recreation as a force in this economy has lagged behind such development in other river basins in Western North Carolina. Until recently, the mountain scenery, rivaling that in the adjacent Little Tennessee River Basin, together with hunting and fishing, has been the main tourist attraction. The growing popularity of the Tennessee Valley Authority lakes for bathing and water skiing as well as for boating and fishing promises a bright future for this phase of the Basin's economy. All of these activities are in some manner benefited by the water resources of the Basin and by judicious use of the waters, each can continue to function to the mutual advantage of all concerned.

2. Continued pollution of Hiwassee River by untreated or inadequately treated sewage above the waters used for bathing and water skiing in Hiwassee and Apalachia Lakes jeopardizes the safety of those who engage in these activities.

3. The discharge of untreated sewage into Hiwassee River near the raw water intake serving the Town of Murphy is a potential hazard to the safety of the public water supply.

4. Local nuisances and health hazards are created by the discharge of inadequately treated sewage into Town Creek at Hayesville and the discharge of raw sewage into Tatham Creek at Andrews and McColl Creek at Murphy.

5. Raw and inadequately treated sewage tributary to Hiwassee and Valley Rivers from private residences in and near both Andrews and Murphy result in undesirable conditions.

6. Pollution abatement in this Basin lags behind that of many other river basins in the State. This is evidenced by the fact that the overall reduction in pollution from the significant sewage and waste discharges is but two percent. In this connection, the County Boards of Education are to be commended for constructing and maintaining adequate sewage disposal systems at the schools not connected to municipal sewerage systems, while the Prison Department of North Carolina, likewise, is to be commended for the treatment given the sewage from the prison camp in Cherokee County.

7. The Towns of Andrews, Hayesville, and Murphy and Hiwassee Resort Village should provide adequate treatment facilities to protect downstream beneficial uses. Where there is indiscriminate pollution of streams by sewage from private residences, the Local Health Departments should encourage the connection of such residences to municipal sewerage systems and if this is not feasible, they should then require the owners to construct their own treatment facilities.

8. Sports fishing is one of the favorite forms of recreation in the Basin with mountain trout being the most highly prized of the catches. Where streams are designated as "trout waters" by the North Carolina Wildlife Resources Commission, they should be protected by appropriate classifications. Valley River is a well-known trout stream. The Towns of Andrews and Murphy, accordingly, should give due consideration to this fact in designing waste treatment facilities.

9. The water discharged from low-level intakes for generating hydroelectric power at the Tennessee Valley Authority installations during periods of lake stratification is low in dissolved oxygen. Such discharges have not resulted in reported fish kills and the absence of large sources of pollution immediately below the dams permits a relatively rapid increase in dissolved oxygen in the released water to more acceptable levels.

10. The recommended classifications, as shown in Table 8, should be adopted and the applicable water quality standards maintained for the protection of these waters for their present and contemplated "best usage".

THE SURVEY

Before a study of stream conditions could be conducted, a systematic survey was made of the water and land uses throughout the Basin. Investigations of all possible sources of significant pollution, public, semi-public, and industrial, were included in the survey in order to determine the points of waste discharge and loadings placed upon the receiving streams. This involved the determination of the volume and characteristics of each significant waste, either treated or untreated, being discharged into the waters of the Basin. In this connection, the investigations did not disclose the presence of industries which may have been discharging industrial wastes into the various waters. The collection of this voluminous data resulted from numerous field investigations and conferences with individuals familiar with the area; including industrial personnel; Municipal, County, State and Federal officials representing water use; and personnel of health, agriculture, recreation, and wildlife agencies. These data are listed in Tables Nos. 2, 3, 4, 5, and 6. The analytical results obtained from the stream studies are listed in Table No. 7.

Sampling Stations and Procedures

The survey included a program of sampling over the entire Hiwassee River Basin, including all the major tributaries and the smaller tributaries that were considered significant to the overall study. This program involved the establishing of sampling stations at sources of public and semi-public water supplies, below impoundments serving hydroelectric projects, and at various points where there is concentrated fishing activity, including trout waters which require special consideration. Particular emphases were placed on those streams receiving appreciable quantities of sewage; however, sampling stations were also established on streams free of known sources of pollution in order to ascertain background information relative to normal water quality in given areas. Wherever possible, sampling stations were located both above and below sources of pollution. When necessary, several sampling stations were located below the source of pollution in order to determine the point of maximum oxygen depletion and the point of full oxygen recovery. The sampling stations established in the Hiwassee River Basin are listed in Table No. 1, together with other pertinent information.

Samples were collected from streams at points of water use, or below points of pollution, after the wastes discharged had reasonable opportunity for dilution and mixture with receiving waters. In each case, every effort was made to obtain as representative a sample as possible. Special equipment was utilized to collect stream samples in conformity with standard procedures. These collecting devices are designed to prevent aeration of samples intended for dissolved oxygen (D.O.) and bio-chemical oxygen demand (B.O.D.) determinations. Apparatus and chemical reagents in appropriate field kits were used by field crews for the determination of routine tests, such as those for dissolved oxygen and water temperature. Physical features of streams, such as flow and weather conditions, were recorded at the time of sampling.

Sampling and field testing operations were conducted in accordance with procedures and methods outlined in "Standard Methods for Examination of Water, Sewage, and Industrial Wastes", Tenth Edition, published by the American Water Works Association, the American Public Health Association, and the Federation of Sewage and Industrial Wastes Associations.

Hydrological Measurements

In order to obtain accurate flow data for the most pertinent sampling stations at the time the samples were taken, field crews worked with the Raleigh and Asheville offices of the Water Resources Division, Surface Water Branch, of the United States Geological Survey. This was made possible by the cooperative program referred to in the "INTRODUCTION". At each sampling station where a permanent water level measuring device was not located, a temporary reference point was installed and the water stage measured when the sample was taken. The flows at various stages were actually measured by use of a current meter and these flows were used to make a rating table for that particular station. Other flows were taken from this table. A system of two permanent stations and eleven temporary points were used to obtain flows in the entire Basin.

Laboratory Tests and Their Significance

When sampling a stream certain tests must be made at the time of the sampling. These include dissolved oxygen, temperature, and observations connected with sight and smell. Other tests were run in the mobile laboratory based nearby. These tests included pH, alkalinity, hardness, chlorides, B.O.D., M.P.N. of coliform bacteria, true color and turbidity, and such other determinations as may be required. The analytical results from the tests are found in Table No. 7.

As a background for presentation and discussion of laboratory data, certain rules and regulations were adopted by the State Stream Sanitation Committee for use in classifying and assigning standards of quality and purity to designated waters of the State. For each class of water designated there are accompaning standards of water quality and purity that are applied thereto. These classes for fresh water are "A-I", "A-II", "B", "C", "D", and "E". A brief explanation of these classes will be found preceding Table No. 8 listing the recommended stream classifications. The discussion that follows is a brief description and explanation of the tests made in the mobile laboratories or in the field while sampling. As far as practicable and applicable, all chemical and bacteriological examinations were made in accordance with "Standard Methods for Examination of Water, Sewage, and Industrial Wastes", Tenth Edition, as described above. These routine determinations are as follows:

Temperature - The temperature of stream waters is useful in indicating the solubility of gases in it, including the saturation level of dissolved oxygen, the effect of biological activities, and the effects of viscosity on sedimentation. The level of dissolved oxygen varies inversely with the streams temperature, being lower at highest temperature and vice-versa. Temperature has a marked influence on the rates of natural purification due to biological activity which are greater at higher temperatures, up to about 140°F, and diminishing at lower temperatures. As temperature rises, viscosity decreases with a resulting increase in sedimentation, provided other factors do not interfere. Temperature becomes more important in mountain streams because of the low temperatures necessary to sustain life of certain species of Mountain Trout.

Turbidity - Turbidity is an index of the density of the suspended matter in a sample and is measured by comparison of a sample with a standard suspension of "Fullers Earth". The results of the measurements are expressed in "turbidity units".

True Color - While the apparent color of water is due both to suspended and dissolved matter, the true color is due only to substances in solution. For the purpose of this study, the true color was determined by removing the suspended matter from each sample by centrifugation and determining the color of the supernatent with the aid of an electric colorimeter. The colorimeter was standardized against a series of standard potassium chloroplatinate solutions made up in accordance with "Standard Methods for the Examination of Water, Sewage, and Industrial Wastes", Tenth Edition. The results of these measurements are expressed in "color units".

pH Value - The hydrogen-ion concentration of water expressed as pH is a measure of intensity factors of its acidity or alkalinity. Water having a pH of 7.0 is considered neither acid nor alkaline. Higher values indicate the presence of alkaline earth salts and lower values the presence of acids or acid salts. In North Carolina the pH of most of the streams, unaffected by sewage or industrial wastes, will vary from 6.0 to 7.5. Swamp waters and certain other natural waters may have a lower range. For normal fish life the pH range should be within the limits of 4.3 to 8.5, although for mountain trout, a pH range of 6.0 to 7.5 is necessary.

Alkalinity - The alkalinity of natural water represents its content of carbonates, bicarbonates, hydroxides, and sometimes borates, silicates, and phosphates. It is measured by titrating with a standard acid solution to certain standard hydrogen ion concentrations. The results are expressed in parts per million (ppm) of Calcium Carbonate. Within normal limits, the alkalinity and hydrogen ion concentration have little sanitary significance, but they are of value in handling industrial wastes and in controlling the various waste treatment processes.

Hardness - The hardness of natural water consists largely of calcium and magnesium, although measurable concentrations of iron, aluminium, manganese, strontium, and zinc in some waters must be taken into consideration. Hardness is expressed in (ppm) as Calcium Carbonate and is a measure of the soap-consuming capacity of water. While the hardness of water has no sanitary significance, extremes may indicate the presence of certain types of industrial waste, or the intrusion of salt water in coastal areas. It also has value in the study of the effects of toxic waste.

Chloride Cl - The determination of chloride in water or waste is for the purpose of defining the presence or absence of salt. It is expressed in (ppm) in terms of the Cl ion. Normal fresh waters are very low in chlorides and excessive amounts may indicate the presence of sewage or certain types of industrial waste. Water containing chloride in excess of 250 ppm is usually unsatisfactory for public water supply purposes because of the salty taste, and may indicate the intrusion of salt water in coastal areas as noted above. The presence of large amounts of chloride in brackish or salt water is significant in relation to the solubility of oxygen, as the level of dissolved oxygen in such waters varies inversely with its chloride content.

Dissolved Oxygen (D.O.) - Dissolved oxygen represents the amount of oxygen dissolved in water. This is one of the most valuable analytical measurements of the condition of a given water. Water is saturated when it contains as much oxygen as it can hold under a given temperature and unsaturated when it does not contain as much. Under certain conditions the water can become supersaturated. In relatively clean streams, the dissolved oxygen content tends to remain at or near saturation. Dissolved oxygen is essential to natural purification of the stream as well as to the maintenance of fish and other aquatic life. In natural streams the dissolved oxygen is used to satisfy

the biochemical oxidation of organic wastes, but tends to be replaced by absorption from the atmosphere and by photosynthetic action of certain green plants. The deficiency of dissolved oxygen in a stream indicates the presence of polluting substances which cause a reduction of oxygen in the stream. The degree of deficiency is a measure of the deoxygenating effect of a particular waste, and hence it is an index of the degree of pollution present in the stream. Where a stream receives waste at a single point and they are well mixed, the dissolved oxygen content tends to follow a typical sag curve on the basis of time, temperature, oxygen demand, and rate of reaeration of the stream which depends in part upon its turbulence.

In North Carolina studies indicate that a dissolved oxygen minimum of 5.0 ppm is necessary to support trout and 4.0 ppm for other types of game fish. Fish life may survive at dissolved oxygen levels of 2.0 or 3.0 ppm, but it is considered that at least 4.0 ppm is necessary to permit the proper breeding and self maintenance of more desirable forms of fish.

Five-Day Biochemical Oxygen Demand (B.O.D.) The B.O.D. test is the most important made in sanitary analyses to determine the polluting power, or strength of sewage or organic industrial waste. It serves as a measure of the degree of treatment needed for successful disposal of polluting substances. The standard test involves the incubation of sealed samples of water or waste for five days at a temperature of 20°C and the measurement of the loss of dissolved oxygen during the period of incubation. The loss represents the 5-day 20°C B.O.D. of the sample. The B.O.D., therefore, is a measure of the amount of dissolved oxygen that may be expected to be absorbed from a stream in five days at 20°C in order to satisfy the biological and chemical oxidation of the organic pollutants carried in the streams at the time of sampling. There is usually a definite relationship between the dissolved oxygen content and the B.O.D. Generally, in a stream below a source of pollution, it is noted that the D.O. is reduced as the B.O.D. is increased. As natural purification takes place, the D.O. will decrease to the point of the oxygen sag from whence it will begin to increase. The B.O.D. will continue to decrease. The change continues, other factors being the same, until the D.O. and the B.O.D. become normal, indicating that the stream has recovered from the effects of the initial pollution.

The Most Probable Number (MPN) of Coliform Bacteria - The coliform bacteria content is used as a general index of the sanitary condition of a stream. This determination shows the approximate density of a group of bacteria which are always present in large numbers in sewage and are relatively few in numbers in other stream pollutants. Coliform bacteria are normal inhabitants of the intestines of all warm blooded mammals and are discharged in very large numbers in human feces, which constitute the principal source of these bacteria in sewage.

The most important use of the coliform bacteria content is evaluating the safety of water as a source of public water supply, as a suitable bathing area, and for shellfish culture.

The recommended standards for surface waters to serve as a source of public water supply with various types of treatment are specified by the United States Public Health Service. These standards designate the following limiting monthly arithmetical average MPN of coliform bacteria per 100 ml: (1) For waters requiring only chlorination, or its equivalent - not more than 50 MPN; (2) For waters requiring complete rapid sand filtration, or its equivalent with continuous post chlorination - average not over 5,000 MPN in one month

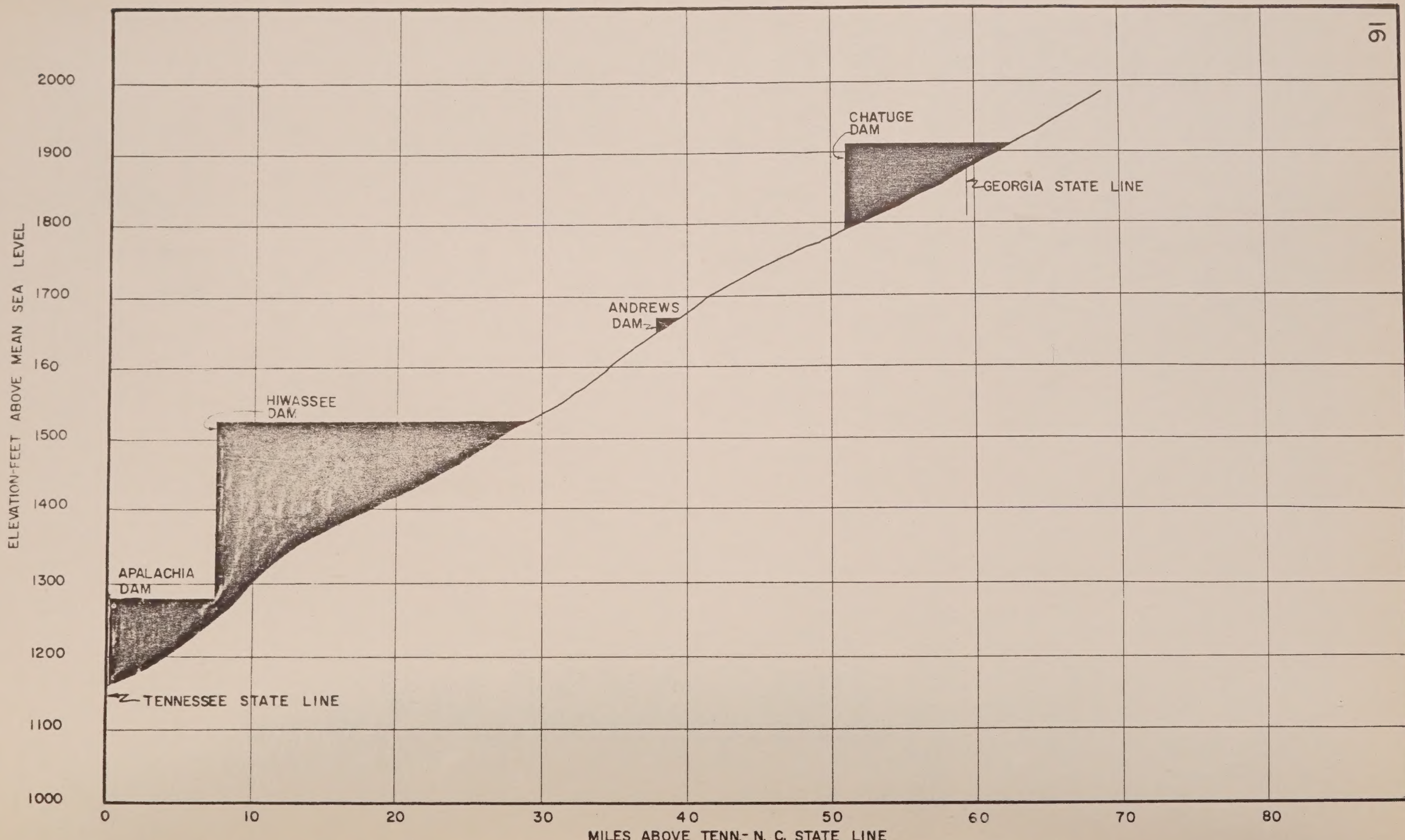
and exceeding this number in not more than 20% of the samples examined in any one month; (3) Waters requiring the above complete treatment with additional auxiliary treatment - exceeding 5,000 MPN in more than 20% of the samples examined during any one month and not exceeding 20,000 MPN in more than 5% of samples examined during any one month; and (4) Over 20,000 MPN in more than 5% of the samples - water unsuitable for use as a source of water supply unless it can be brought into conformance with acceptable limits by means of long-period storage or some other measure of equal permanence and reliability.

There are no generally recognized standards for classification of bathing waters with respect to their coliform bacteria content. Coliform bacteria standards have been proposed that vary from an MPN value per 100 ml. not over 50 to not over 3,000. In considering the suitability of water for public bathing, a sanitary survey of the drainage area and the supervision given by controlling health authorities should be considered, as well as the bacteriological content of the water.

Throughout this report, especially in the tables, certain abbreviations have been used. They are listed below:

B.O.D. - Biochemical Oxygen Demand
cfs - Cubic Feet Per Second
D.O. - Dissolved Oxygen
D.S. - Domestic Sewage
M - Municipal
M.G.D. - Million Gallons Per Day
M.P.N. - Most Probable Number
P - Private
ppm - Parts Per Million
P.E. - Domestic Sewage Population Equivalent
G.P.D. - Gallons Per Day

CONDENSED PROFILE OF THE HIWASSEE RIVER



GENERAL DESCRIPTION

The Hiwassee River Basin drains an estimated area of 656 square miles in North Carolina. The drainage system has three main streams in the State, the Hiwassee River proper, the Nottely River, and Valley River. The Nottely and Hiwassee Rivers both flow northwestwardly from their headwaters on the Blue Ridge at the Tennessee Valley Divide in North Georgia.

Hiwassee River proper has its headwaters on the Tennessee River Divide in Towns County, Georgia. The river crosses the North Carolina-Georgia State Line about five miles southeast of Hayesville and then flows across the tip of western North Carolina through Clay and Cherokee counties into Tennessee, joining the Tennessee River at Mile 499.4, 35 miles upstream from Chattonooga. Valley River, the largest tributary in the North Carolina portion of the Hiwassee River Watershed, drains 117 square miles and joins Hiwassee River near the lower corporate limit of Murphy. The River has its origin at Red Marble Gap near Topton and flows southwesterly throughout its course. Nottely River rises in Georgia, about 3.0 miles south of Blairsville, crosses the North Carolina-Georgia State Line about 6.0 miles east of Culberson, thence flows northerly, southwesterly, and northeasterly in Cherokee County to its confluence with Hiwassee River in Hiwassee Lake about 2.5 miles west of Murphy.

Other tributaries of Hiwassee River which are smaller and of less importance than the above are, Shooting, Tusquitee, Fires, Sweetwater, Brasstown, Peachtree, Hanging Dog, Beech, Grape, Chambers, Beaverdam, and Rose Creeks.

The Basin encompasses all of Cherokee County and part of Clay County as follows:

County	Total Area (Square Miles)	Estimated Area Within Basin (Square Miles)	Percent in Basin
Cherokee	467	467	100
Clay	219	189	86
	686	656	

Topography

The Hiwassee River Basin lies wholly within the Southern Appalachian Mountain Region of the State. The general topography consists of mountain ranges with sharp, narrow ridges, and peaks surrounding the foothills. The slope of Hiwassee River averages 13.5 feet per mile over its full length but varies widely as the stream goes from a reach of gentle slopes with wide bottoms to steep gorge sections. Valley River falls an average of 11.5 feet per mile for 19 miles between Andrews and Murphy and 7.5 feet per mile for the lower four miles. The important ranges are: Vineyard Mountains, Chunky Gal Mountains, Yellow Mountain, and Blue Ridge. Although the entire area is mountainous, the topography is also characterized by lower mountains or hills and valley lands lying between higher ranges. The most conspicuous valley, one-half to one mile in width, extends along the Valley River from Andrews to Murphy in Cherokee County.

Cover and Climate

The Towns of Murphy, Andrews and Hayesville are the principal municipalities within the Basin, all having a population of less than 2,500. The entire Basin, therefore, is considered to be rural with an approximate population

of 24,000 based on the 1950 census. The population is quite scattered, with the number per square mile ranging from 27 in Clay County to 39 in Cherokee County.

The terrain is mountainous with 85% forest coverage. Approximately 138,000 acres of the huge Nantahala National Forest lie within the Basin. The area also contains 223,000 acres of privately-owned forest land.

The year-round average temperature for the entire Basin is generally cool as compared to other sections of the State. For instance, while the yearly average temperature for the Hiwassee River Basin for 1958 was a cool 56.5°F, the yearly average for the Neuse River Basin which lies largely in the Piedmont, is 61.5°F. The average temperature encountered during the study was 68.4°F. This was slightly higher than the annual average because the samples were collected during the months of July, August, and September, which included the months of highest temperatures. The high and low temperatures proved to be rather extreme, ranging from a high of 95°F on July 31, 1958, to a low of 9°F on December 17, 1958, at the Andrews Station.

While there were no major interruptions to the sampling program during the study due to high flow, above normal rainfall in the Basin in July resulted in higher flows than usual in unregulated streams to about the middle of August. It should be noted that the flows in regulated streams below hydroelectric projects varied in accordance with operating procedures. Such flows were reduced to very low values when hydroelectric power was not being generated during the period of the stream study. Rainfall in the mountain areas is very spotty and heavier than in the lowlands. As a comparison, the long term average yearly rainfall for the Hiwassee River Basin is 59.03", while it is only 47.40" for the Tar River Basin.

Although some snow was recorded at the Andrews Station during the winter months, there were no large accumulations. Snow and ice formations on the mountains apparently had no ill effect on the streams and served only to increase the flow in the Spring when melting began.

Stream Flow

Throughout the Hiwassee River Basin, there were 11 various types of gaging stations established to obtain flows in connection with the Stream Study Program. Of these, there were three permanent and active stations maintained and operated by the United States Geological Survey. These permanent stations are located as follows:

1. Hiwassee River below Chatuge Dam, near Hayesville, North Carolina
2. Hiwassee River above Murphy, North Carolina
3. Valley River at Tomotla, North Carolina

Flow data for each of these stations are available through the District Office of the United States Geological Survey, Raleigh, North Carolina. Maximum, average, and minimum flows, and the exact location and years for which records are available at each of the stations mentioned above are found in Water-Supply Paper 1556 as published by the United States Geological Survey and are listed below for ready reference:

Hiwassee River Below Chatuge Dam, Near Hayesville, North Carolina.

Water Stage Recorder. Datum of Gage is 1,789.90 feet above mean sea level. Located at latitude 35° 01' 45", longitude 83° 47' 45", on left bank

0.4 mile upstream from Hyatt Mill Creek, 1.6 miles downstream from Chatuge Dam, 1.7 miles southeast of Hayesville in Clay County, and at mile 119.3. Drainage area 190 square miles. Records available May, 1907 - December, 1909 (fragmentary), August, 1922 - September, 1923 (gage heights only), April, 1942 - September, 1958. Published as "near Hayesville" 1907 to 1909, 1922 to 1923. Minimum discharge 0.6 cfs October 21, 1952. Average for 16 year period 434 cfs. Maximum discharge not determined; however, maximum gage height reported, 11.9 feet March 13, 1909, at site and datum then in use. Records excellent except those below 10 cfs, which are good. Flow completely regulated by Chatuge Lake.

Hiwassee River Above Murphy, North Carolina.

Water Stage Recorder. Datum of gage is 1,538.23 feet above mean sea level. Located at latitude 35° 04' 50", longitude 84° 00' 10", on right bank on United States Highway 64, 600 feet upstream from Will Scott Creek, 1.9 miles east of Murphy, Cherokee County, and at mile 99.2. Drainage area 406 square miles. Records available June, 1896 - August, 1897 (gage heights only), October, 1897 - September, 1958. Published as "at Murphy, North Carolina" prior to April, 1940. Minimum daily discharge 10 cfs December 3, 1924, as a result of freezing and filling Andrews Lake. Average for 61 year period 910 cfs. Maximum discharge 23,100 cfs March 19, 1899 (gage height, 18.4 feet, from graph based on gage readings, site and datum then in use.) Records excellent except for periods of ice effect, which are good. Considerable diurnal fluctuation caused by Mission Power Plant at Andrews Dam. Flow regulated by Chatuge Lake.

Valley River at Tomotla, North Carolina.

Water stage recorder and concrete control. Datum of gage is 1,556.46 feet above mean sea level. Located at latitude 35° 08' 20", longitude 83° 58' 50", on right bank at highway bridge at Tomotla, Cherokee County, 0.2 mile upstream from Rogers Creek, 4.7 miles northeast of Murphy, and at mile 6.4. Drainage area 104 square miles. Records available June, 1904 - December, 1909, January, 1914 - April, 1917, October, 1918 - September, 1958. Minimum discharge 12 cfs several times in August and September, 1925. Average for 46-year period 252 cfs. Maximum discharge observed, 9,030 cfs November 19, 1906. Records excellent, except for periods of ice effect, which are good.

ECONOMIC DEVELOPMENT

Population

The estimated population of the Hiwassee River Basin, based on the 1950 census, is approximately 24,000. This indicates a decrease of 3.2% as compared with the 1940 census. This decrease can probably be attributed to the fact that Chatuge Dam, Hiwassee Dam, and Nottely Dam all of which are located in the Basin or in close proximity to it, were under construction during the 1940 census. When the dams were completed the construction crews moved out; therefore, a decrease in population was shown in 1950. There are 12 townships which are wholly, or partially, within the drainage area. The Basin contains no urban areas, the principal towns being Murphy and Hayesville.

Industry

Industry in the Hiwassee River Basin is somewhat diversified, ranging from textiles, to lumbering, to mining. Lumbering and the manufacturing of timber products are the chief industry.

Electric Power

Power demands in the Basin are served by the systems of the Nantahala Power and Light Company and the Tennessee Valley Authority. The Nantahala Power and Light Company owns and operates one hydroelectric generating plant on the Hiwassee River known as the Mission Hydroelectric Power Plant. This plant has a capacity of 2,200 KW. The Chatuge and Hiwassee Hydroelectric Stations, owned and operated by the Tennessee Valley Authority, have a total capacity of 127,100 KW. These two generating plants and the Nottely plant on the Nottely River in Georgia are operated as one unit for the purposes of flood control, navigation and power, and are a part of the overall TVA System.

The operation at Hiwassee Dam is unique in that it has a pump turbine. To obtain power during hours of heaviest demand than would be possible with a conventional hydroelectric generator, TVA installed a machine at the Dam that generates power during peak use hours, and pumps water back into the reservoir in off-peak hours. It is called a "reversible unit" or pump turbine, and the machine in Hiwassee Dam was the worlds largest at the time of its installation.

When operated as a turbine, water from Hiwassee Lake flows through the wheel, rotates the unit in a clockwise direction, turns the generator, coupled to the same shaft, which is capable of producing 59,500 kilowatts of power. When operated as a pump, surplus electric power generated elsewhere on the TVA System is applied to the motor generator, causing the entire unit to rotate in a counter-clockwise direction. This reverse rotation causes the water wheel to act as a 102,000 horsepower pump and to lift the water from the downstream basin (Apalachia Lake) up through the penstocks into the reservoir above the Dam. As a pump, it can return water to the upstream reservoir at a rate of 1 3/4 million gallons per minute.

The general terrain in the entire basin is well adapted to the development of hydroelectric power. Because of this, the Nantahala Power and Light Company and the Tennessee Valley Authority have developed the area.

The following tabulation lists the hydroelectric plants, including the owner, type, KW capacity, and the average discharge.

Name	Stream	KW Capacity	Annual Average KW Hrs. Generated	Average Discharge cfs	Owner	Type
Mission	Hiwassee R.	1,800	10,586,700	682	Nantahala Power and Light Co.	Hydro
Hiwassee	Hiwassee R.	117,100	-	3,521*	Tennessee Valley Authority	Hydro
Chatuge	Hiwassee R.	10,000	-	1,386*	Tennessee Valley Authority	Hydro

* Average discharge during stream studies as reported by power plant operators.

Forest Resources

The Hiwassee River Basin includes 85% forest land, of which the State and Federal Governments own approximately 40%. The Nantahala National Forest encompasses approximately 138,000 acres of forest lands or 33% of the total land area.

All public forest land is not available for commercial timber. Cutting operations are not permitted within the boundaries of parks, recreation areas, memorial forests, and municipal watersheds. There are many acres of rock outcrops, cliffs, and mountain balds which are classified as non-commercial because of poor site conditions. Timber and wood products provide a major industry in the entire area. This is indicated by the numerous saw mills and veneer plants located in every section of the Basin.

The following is a tabulation of some of the forest uses listed in Forest Survey Release Number 46, January, 1956. The figures listed are totals for each county.

County	Total Forest Land-Acres	Public-Owned Forest Land-Acres	Saw Timber Million Bd. Ft.	Pulpwood Production 1955 Std. Cords
Cherokee	255,700	87,500	456.3	32,756
Clay	220,000	60,400	365.3	-
Total	475,700	147,900	821.6	32,756

Agriculture

The chief crop produced in the Basin is corn, the greater part of which is used for feed purposes at home. Hay crops and grasses are second in order of importance in the Basin. While tobacco does not account for the greatest acreage, Burley tobacco ranks high among the field crops from the standpoint of farm income. In 1956, 135 acres of tobacco brought $123,000. The production of truck crops is being promoted throughout the area in order to provide additional farm income. Beef and dairy cattle raising increased during the period 1951-1958, and the production of milk has boosted farm income slightly during the past several years. Hogs are raised primarily for home use. The

poultry industry in 1954 showed a sharp increase over the previous reporting year of 1950. While the number of farms reporting decreased, the number of chickens sold in 1954 increased sharply. In 1954, 518 farms sold 216,863 chickens, as compared with 1950 when 1,100 farms sold 121,374 chickens.

The following is a tabulation, by counties, of money received by farms for different farm commodities:

County	Value of Chickens & Eggs Sold in 1954	Value of 11 Principal Crops - 1956	Value of Livestock Sold
Cherokee	$ 395,724	$ 788,590	$327,882
Clay	658,608	625,680	185,014
Total	$1,054,332	$1,414,270	$512,896

Fish and Wildlife

Fishing is extensive throughout the Basin. It is reported that bass, bream, crappie, trout, catfish, and carp are found in the waters of the area. Many of the streams in the Basin are designated "Trout Waters" by the North Carolina Wildlife Resources Commission due to the clean, cool and clear water that is prevalent. The North Carolina Wildlife Resources Commission annually stocks many of the streams in the area with trout, as well as working with the U. S. Forest Service in the management of additional trout streams within the National Forest. As a result of the combined forces of man and nature, the streams and lakes in the Basin provide excellent recreation and sport for the fresh water fisherman.

The principal fishing lakes and the species of fish found in them are described below:

Hiwassee Lake in Cherokee County is a 6,240-acre lake on Hiwassee River with a 150-mile shore line. It is open all year for fishing for large and small mouth bass, Walleyes, and pan fish. Docks are located at Murphy. Many cabins surround the lake.

Lake Chatuge located in part in Clay County and in part in the State of Georgia, is a 7,150 acre lake on Hiwassee River. It is open all year for fishing. Large and small mouth bass, and pan fish are available therein. Lake Chatuge is said to be one of the best crappie fish lakes in the country.

Mountain Trout Fishing

Because of the importance of mountain trout fishing in the Hiwassee River Basin, special attention should be given to this species regarding their habitats and requirements.

The mountain trout group includes several types, the most widely known being the Rainbow trout, Brown trout, and Brook trout, all of which are very highly-prized game fish. The Rainbow trout are usually found in more abundance, while the Brown trout are generally the most sought after by fishermen because they are difficult to land and generally heavier in weight. Brown trout weights up to seven pounds are not uncommon. These types of fish are abundant in this Basin because the cool, clean, and fast moving waters are adapted to their propagation and growing conditions. A cool temperature is probably the most important of the conditions needed, with a high oxygen content next. A temperature not exceeding 75°F. is necessary for all trout

producing streams, while 5.0 ppm D.O. should be maintained, although life can be sustained in waters containing as low as 3.0 ppm D.O. if the temperature is lower. Other important characteristics necessary for these waters are a CO_2 not exceeding 6-7 ppm, M.O. alkalinity of not over 150 ppm, and a low turbidity. The low turbidity requirement in the Basin is of great importance. It is necessary for the trout to find a spawning area where the water is moving fast and has a rocky bottom. The eggs are laid in the gravel on the stream bed from 2 to 4 inches below the surface and covered with other gravel. The hatching period is rather long and even a small amount of silt in the water over a period of several months could cover the eggs enough to kill them. Heavy silt will also tend to choke out aquatic life upon which the trout depends for 60% of its food.

Because mountain trout fishing is so popular in this area the North Carolina Wildlife Resources Commission has designated various streams as "Trout Waters" and they should be protected as such. These streams are noted as trout waters in Table No. 8 - Recommended Classifications.

Hunting

Hunting for wild game such as bear, deer, Russian Wild Boar, rabbit, squirrels, and wild fowl such as grouse and quail is termed very good. Muskrat are abundant and are trapped extensively.

The one wildlife management area, Fires Creek Wildlife Management Area, contains 14,000 acres and is located north of Hayesville. For the hunter this area offers opportunities seldom equaled. The number of hunters is regulated to assure sustained game protection as the game multiplies under good management. A balance must be maintained between the game and the natural food supply available in the protected areas. Open season hunting, regulated in accordance with careful periodic studies of wildlife conditions, offers a practical solution in removing surplus game.

Mineral Resources

The mineral resources of the Hiwassee River Basin are of the non-metallic and abrasive types.

Some exploratory work was done on Buck Creek in Clay County during World War II for corundum; however, none was ever produced commercially.

Talc occurs in the Murphy area and there are two large plants which produce high-grade talc in large quantities. Marble is produced at quarries at the Community of Marble in Cherokee County. Neither gems nor precious stones occur in the area. However, there are numerous rocks that interest the "Rockhounds".

Parks and Recreation

The area which encompasses the Hiwassee River Basin is becoming more popular as a tourist attraction each year. While the area is not as highly developed recreation-wise as the Little Tennessee River Basin, it appears that the natural beauty of the mountains and the countryside will in the future provide an even greater influence on the economic life of the Basin. There are numerous scenic trails through the National forest which attract tourist who are seeking the rough country during the summer months. Five picnic and camp sites are maintained in the Basin by the National Park Service

to add to the comfort and attractiveness for those seeking outdoor recreation. These recreational areas are distributed in all sections of the Basin, thus providing ready access to those seeking such facilities. Improved recreational areas such as Lake Cherokee Camp Ground, Grape Creek Recreational Area, Shooting Creek Vista, Bob Allison Place, and Britton Creek Camp Ground are shown on the map included in this report and described briefly below:

Shooting Creek Vista is located on U. S. Highway #64 near Glade Gap, Clay County. Here one of the most beautiful views to be found in the Nantahala National Forest is available to tourists. Picnic tables are provided.

Lake Cherokee Camp Ground is located eleven miles west of Murphy and provides camping space for tent camping on the Lake Cherokee arm of Hiwassee Lake.

Grape Creek Recreational Area, located on Hiwassee Lake along Joe Brown Highway, has facilities for camping, picnicking, boating and fishing.

Bob Allison Place, on Tuni Gap Road on Tuni Creek, provides a picnic area.

Britton Creek Camp Ground, a public picnicking and camping site, is located on Britton Creek three miles north of Andrews.

In addition to these smaller recreational areas, there is one resort which is described as follows:

Hiwassee Resort Village, Cherokee County. During the construction of Hiwassee Dam, on Hiwassee River, a village was built to house construction workers. This Village was originally composed of 42 houses and 17 dormitories. The water supply for the Village, which was obtained from Hiwassee Lake, received conventional treatment and was chlorinated prior to use, while the domestic waste was treated by means of a septic tank, the effluent from which was discharged into the backwater of Apalachia Lake. The entire Village, including 42 houses and several other buildings which house the post office, store, and restaurant, was purchased by private enterprise in 1958 after the completion of the stream studies in the Hiwassee River Basin. The Village is now being developed into a resort village capable of housing approximately 350 persons, including the staff and maintenance personnel. The water supply for the time being remains the same as does the sewage treatment facilities.

Tennessee Valley Authority Lakes

The ever increasing popularity of and the demand for water recreation has prompted the Tennessee Valley Authority to permit such use of the TVA-owned lakes. In the Hiwassee River Basin, Chatuge, Hiwassee, and Apalachia Lakes are now used for boating, fishing, bathing, and water skiing.

Transportation

The entire Basin is served by a network of Federal and State Highways as well as by many secondary roads. U. S. Highway #64 crosses the southern section of the Basin, connecting important points within the Basin, and also connecting the area to the Little Tennessee River Basin and the State of Tennessee. U. S. Highway #19 and #129 extends from the northeastern tip of the Basin and crosses the Basin to the State of Georgia at the southwestern tip, thus providing transportation across the Basin and to the north and south.

The Southern Railway System operates a line for freight only from Murphy to Asheville. The Louisville and Nashville Railroad has a line from Murphy southwest into Georgia.

No commercial airlines operate in the Basin. The nearest commercial airline facilities are at Asheville - Hendersonville airport near Asheville. The Andrews-Murphy airport located on U. S. Highway #19-129 southwest of Andrews serves private air transportation in the area.

The streams are not navigable by large craft; however, numerous boats are found on the lakes which are used for fishing and pleasure purposes.

GENERAL SURVEY FINDINGS

For convenience in presenting the survey findings relative to present and potential water and land uses, Hiwassee River has been divided into several segments. These segments are defined according to their potential best usage, as well as for their topographic characteristics. Additional water and land uses, together with data relative to these uses, are summarized in Table No. 2, Public and Semi-public Surface Water Supplies; Table No. 3, Public and Semi-public Ground Water Supplies; Table No. 4, Points of Significant Sources of Pollution; Table No. 5, Schools; Table No. 6, Prison Camps; Table No. 7, Analytical Results; and Table No. 8, Recommended Classifications. There are 17 schools in the Basin as noted in Table No. 5; however, only those schools will be included in the discussion to be given below which have either treated or raw sewage reaching a stream. Only two schools discharge raw sewage and this is connected to municipal sewage collection systems from which all sewage is discharged into the receiving waters without treatment. There is only one prison camp and this will be discussed briefly as sewage effluent is discharged to a tributary of a public water supply.

SEGMENT I. HIWASSEE RIVER AND ITS TRIBUTARIES FROM NORTH CAROLINA-GEORGIA STATE LINE TO CHATUGE DAM

Chatuge Lake, developed for power and flood control by the Tennessee Valley Authority, is growing in popularity as a recreational area for boating, fishing, bathing, and water skiing. Shooting Creek is not only known for its trout fishing, but is the site of Shooting Creek Vista which has facilities for picnicking. Other streams are also used for fishing.

There are no known significant sources of pollution in this Segment due to sewage or industrial waste and, in addition, it is understood that the waters of Hiwassee River in the State of Georgia are relatively free from man-made pollution. While no samples of water were collected from Chatuge Lake, the results of the analyses of samples collected from the river at Sampling Station No. 101, some 1,100 feet below the dam, show the water contained coliform bacteria well within the limits normally considered safe for outdoor bathing waters.

SEGMENT II. HIWASSEE RIVER AND ITS TRIBUTARIES FROM CHATUGE DAM TO ANDREWS DAM

The Town of Hayesville supplies a population of 600 with some 8,000 G.P.D. of water from a well and 58,000 G.P.D. from two springs. The water from the springs is chlorinated prior to use.

Bob Allison Place, on Tuni Creek, has facilities for both picnicking and camping. The Fires Creek Wildlife Management Area is a favorite haunt for the hunter. Both Tuskuitee Creek and Tuni Creek are excellent trout streams, while the river and many other streams of the Segment afford good fishing for species of fish other than trout.

Andrews Dam, on the main stem of Hiwassee River, forms Mission Lake which is used to generate hydroelectric power by the Nantahala Power and Light Company. This is a rather small and relatively shallow reservoir with limited storage; therefore, the generation of power at this site must by necessity be very closely related to releases of water for power generation at Chatuge Lake.

There are two sources of pollution in this Segment, including the treated sewage from the Hayesville High School, which are described as follow:

Hayesville High School discharges the sewage from an enrollment of 900 and the waste from the kitchen to a well-operated secondary treatment plant consisting of a septic tank and sand filter. The plant effluent enters Town Creek above Sampling Station No. 103 on this creek and above Hiwassee River. The analyses of samples collected at Sampling Station No. 103, after the school was opened for the school year, show no appreciable change in the quality of the water due to the discharge of effluent from the school sewage treatment plant. If this sewage treatment plant continues to receive good operation and maintenance, it should be satisfactory for the present.

The Town of Hayesville, with a 1950 population of 356, has a separate type sewage collection system serving a total population of 400, according to information supplied by a Town Official at the time of the survey. A recent evaluation by this same official, however, indicates that the total population served is probably not more than about 140. The sewage is treated by means of two septic tanks known, respectively, as the Town Creek Plant and the Hiwassee River Plant. While each will be described separately, they are considered to be a single source of pollution for purposes of this report.

The Town Creek Plant, located near a populated area, serves a population of 100, based upon the information secured at the time of the survey, or about 63 persons according to the more recent evaluation. In any event, the septic tank with a capacity of but 3,000 gallons is overloaded and, in addition, it is poorly operated. The plant effluent is discharged to Town Creek by means of a ditch. The analyses of samples collected from the creek at Sampling Station No. 103, located below the ditch, show that, while the dissolved oxygen assets were reduced but slightly by the effluent, the bio-chemical oxygen demand (B.O.D.) of the water in the creek was increased materially. In addition, the coliform bacteria were increased from an average of 3,500 (MPN) per 100 ml at Sampling Station No. 102 above the plant effluent to an average of 190,000 (MPN) per 100 ml. at Sampling Station No. 103 below this inadequately treated sewage. It is understood that recently a complaint has been made as to the discharge of such waste into what is essentially a dry ditch so near a public school. Obviously, the present practice violates the principles of good sanitation and should be considered a public health hazard.

The Hiwassee River Plant, located on Hiwassee River remote from populated areas, serves a population of 300, based upon the information supplied at the time of the survey, or about 77 persons according to the latest evaluation. There are no plans available for this septic tank and since it is buried beneath the ground, it was not practicable to secure its diminsions; however, from the appearance of the effluent, in spite of poor operation, it is believed that for the time being at least this septic tank is adequate for primary treatment.

In considering the effects of the pollution from the Town of Hayesville upon Hiwassee River, it is necessary to take into consideration the condition of the water as it flows by the Town and the amount of water available in this highly-regulated stream for purposes of dilution of pollutional wastes.

As noted previously in this report, the watershed of Hiwassee River is free from sources of man-made pollution of any significance above Chatuge Dam and the lake waters are safe for bathing. While this is so, the lake receives natural organic pollution to the extent that water withdrawn through the

low-level intake, during the periods of generating hydroelectric power, is low in dissolved oxygen when this rather deep lake is stratified. This situation is not uncommon for other similar installations. Accordingly, it is not surprising to find that under the conditions studied samples of water collected from Hiwassee River at Sampling Station No. 101, some 1,100 feet below the above dam had an average dissolved oxygen content of but 3.6 ppm and as little as 2.3 ppm with saturation values of 39% and 26% respectively. It is believed that these values would have been lower except for the fact that the river below the dam is swift-flowing and turbulent.

These conditions, favorable for reaeration of the water, persist to the vicinity of Mission Lake and as a result, the river continues to recover its dissolved oxygen assets as it flows by the Town of Hayesville and receives the pollution arising in this Town. The dissolved oxygen in the river at Sampling Station No. 104, below this pollution and 4.4 miles below Chatuge Dam had increased to a minimum of 4.2 ppm which is sufficient to support fish life.

It is concluded, therefore, that the effluent from the Hiwassee River Plant and the pollution in Town Creek do not presently seriously affect the uses made of Hiwassee River in this Segment.

The Town of Hayesville, nevertheless, must provide adequate protection for Town Creek and remove the public health hazard existing in the effluent ditch below the Town Creek Plant. In this connection, the Town should consider the construction of a new sewage treatment plant, as a replacement for the present Town Creek Plant, at a site remote from populated areas. Due consideration should be given to the fact that Town Creek is a small stream with very little flow in dry seasons. Relative to the Hiwassee River Plant, Hiwassee River is a highly regulated stream with very low flows when hydroelectric power is not being generated. Should there be any great increase in organic loading upon this plant, it will be necessary to take into consideration the low flows existing in the river and provide treatment as required to protect the downstream uses made of the river.

SEGMENT III. HIWASSEE RIVER AND ITS TRIBUTARIES FROM ANDREWS DAM TO TOWN OF MURPHY RAW WATER INTAKE

This Segment of Hiwassee River is one of the sources of raw water supply for the Town of Murphy. Some 100,000 G.P.D. of water is introduced into the water distribution system after conventional treatment and chlorination. As will be discussed in greater detail under Segment IV, the Town of Murphy discharges untreated sewage into Hiwassee River by means of nine outfalls. One of these outfalls, located across the river and slightly downstream from the water intake, serves an estimated population of 12. Obviously, the close proximity of untreated sewage to a raw water intake is highly undesirable and the Town of Murphy should remove this possible public health hazard at an early date.

Fishing is the primary form of recreation in this Segment and, while there are no designated trout waters, the river and its tributaries contain a number of species for the angler.

As noted previously in the report, Mission Lake on Hiwassee River, is formed by Andrews Dam and is a source of hydroelectric power for the Nantahala Power and Light Company. It is a relatively small and shallow lake and it is interesting to note that under the conditions studied in 1958, the water both

above the dam and in the tailrace below contained an average of 7.9 ppm dissolved oxygen or a saturation level of about 89%. This is in contrast to the much lower saturation values of dissolved oxygen found below the much deeper Chatuge Lake. Quite possibly, the water in this shallower lake does not become stratified. In both cases, the water released when power is not being generated during dry seasons is leakage only.

There are no municipal discharges of sewage in this Segment; however, sewage is discharged after treatment into tributaries of the river from a prison camp and two schools which are described as follow:

N. C. Prison Unit #141, a prison camp with a capacity for 100 people, is located on McCombs Branch south of the small Community of Peachtree. A well-operated secondary type sewage treatment plant, consisting of a septic tank and sand filter, served a population of 97 at the time of the stream studies. The plant effluent is discharged to McCombs Branch.

Peachtree School, with an enrollment of 200, is located in the small community of Peachtree. The sewage and the waste from the kitchen are also served by a well-operated secondary type sewage treatment plant consisting of a septic tank and sand filter. The plant effluent is discharged to Peachtree Creek.

Martin Creek School, in the Community of Martin Creek, has an enrollment of 300 which is served by a well-operated secondary type sewage treatment plant consisting of a septic tank and sand filter. Both the sewage and kitchen waste are treated in this plant, the effluent from which is discharged into Martin Creek.

All three of these sewage treatment plants are located on tributaries to Hiwassee River above the raw water intake for the Town of Murphy. Samples of water collected from the river a short distance above the intake, after the schools opened, showed no significant change over the conditions prevailing before that time. In this connection, the analyses showed that the water contained coliform bacteria well within the limits acceptable for the treatment provided by the Town of Murphy. If these sewage treatment plants continue to receive satisfactory operation, they should provide adequate protection for this source of water supply for the Town for the time being.

SEGMENT IV. HIWASSEE RIVER AND ITS TRIBUTARIES FROM TOWN OF MURPHY RAW WATER INTAKE TO MOUTH OF LAUREL CREEK

The Town of Andrews derives 200,000 G.P.D. of raw water from Beaver Creek and serves a population of 1,520 and the Berkshire Knitting Mills after the water is filtered and chlorinated. The Town is proposing to secure an additional water supply from Dan Holland Creek and Britton Creek. The Town of Murphy secures 200,000 G.P.D. of raw water from Marble and Brittain Creeks and after filtration and chlorination, the Town serves a total population of 2,600 with this treated water and with the treated water secured from Hiwassee River. The Hemmerick Corporation near Murphy uses some 3,000 G.P.D. from a well to supply 95 employees with domestic water.

Valley River and Junaluska Creek are excellent trout waters, while Hiwassee River and many of its other tributaries support other species of fish. Boat docks are available in Hiwassee Lake near Murphy. The Britton Creek Camp Ground on Britton Creek near Andrews has facilities for picnicking and camping.

This Segment contains two significant sources of pollution which consist of untreated sewage from the Towns of Andrews and Murphy. These wastes have an estimated flow of 415,000 G.P.D. and a P.E. of about 4,000, including the adjustments for the sewage and kitchen wastes from the Andrews School, with an enrollment of 1,000, and the Murphy Grade School, with an enrollment of 1,200, which are served by the respective Town sewage collection systems. In addition, treated sewage is discharged from the sewage disposal system of the Murphy High School which has an enrollment of 600.

The Berkshire Knitting Mills Sewage Disposal System is not presently a source of pollution; however, it is briefly discussed below for purposes of record and future observation. The above are discussed as follows:

The Berkshire Knitting Mills, located near the Town of Andrews, are engaged in knitting ladies full-fashioned hosiery, which is dyed and finished at other plants. The domestic sewage from 228 employees is treated by means of a septic tank and a sand filter trench. The sand filter trench was constructed to discharge the effluent to Junaluska Creek near the plant; however, the effluent has never been known to reach the Creek, except possibly by filtration through the ground. This appears to be due to the fact that the filter trench was constructed in very porous soil which absorbs the liquid before it reaches the underdrain or at least before it reaches the end of this drain. It is, therefore, felt that this sewage treatment plant should adequately serve this industry for some time in the future and thus provide adequate protection for downstream water uses, provided its loading is not unduly increased.

The Town of Andrews, with a 1950 population of 1,379, has a separate type sewage collection system serving an estimated population of 1,325. Two outfalls discharge untreated sewage to Tatham Creek, a tributary to Valley River, while eight outfalls also discharge untreated sewage directly to Valley River. The wastes, with adjustment for the Andrews School enrollment, have a total estimated P.E. of 1,525.

These untreated wastes create local nuisance conditions due to odors and accumulations of paper, sludge, and other solids were observed in the creek and river in the vicinity of Andrews. While the several sources of pollution are considered as one for the purposes of this report, the conditions in Tatham Creek were particularly objectionable and constituted a public health hazard.

The analyses of samples collected at Sampling Station No. 110, below all pollution from the Town of Andrews, showed that the water under the conditions studied was well-saturated with dissolved oxygen, had a relatively low B.O.D., but had an average coliform bacteria content of 120,000 (MPN) per 100 ml. In this connection, it should be noted that the average flow in the river at this point was 48 cfs, while on the other hand, the minimum flow of record at the U. S. Geological Survey gaging station at Tomotla was but 12 cfs on several occasions in 1925. While the normally accepted sewage treatment design flow is slightly above the minimum flow, this means, nevertheless, that under critical conditions of high temperature and low flow, the waste discharges from Andrews would have a still further adverse affect upon the river. The fact that the river is designated as trout waters means that a high quality water must be available at all times.

The Town of Andrews should provide interceptors to carry the sewage to a suitable point for treatment adequate to protect all beneficial downstream uses made of the river and at the same time remove the local nuisances and the

health hazard in Tatham Creek. In this connection, perusal of the analyses of samples collected from the river at Sampling Station No. 108, located above the Town of Andrews, show that incidental pollution is reaching this stream from private outfalls. If the Town of Andrews is unable to receive this waste into its sewage collection system, then the Local Health Department should make every effort to secure the installation of private sewage treatment systems.

Murphy High School, with an enrollment of 600, is served by a well-operated secondary type sewage treatment plant consisting of a septic tank and sand filter. The plant effluent is discharged into Valley River a short distance upstream from Sampling Station No. 113. The results of the analyses of samples collected at this station, after school started, showed that there was no appreciable change in the conditions prevailing before that time.

The Town of Murphy, with a 1950 population of 2,433, has a separate type sewage collection system serving an estimated population of 2,300. The total P.E. served by this system is 2,475, with adjustment for the waste from the Murphy Grade School having an enrollment of 1,200. The topography is such that part of the Town drains to Valley River and part to Hiwassee River and for purpose of clarity, the sewage disposal problem will be discussed under these headings. The wastes discharged to Valley River, including that discharged into McColl Branch above this river, have a total P.E. of 1,200, while those discharged to Hiwassee River, including the waste from the Murphy Grade School, have a total P.E. of 1,275.

Valley River

Untreated domestic sewage is discharged directly to Valley River in the vicinity of Murphy via three outfalls and two other outfalls which receive the effluent from two septic tanks which are overloaded to the point that they provide no treatment. In this connection, it should be noted that the effluents from these septic tanks are dark in color and slightly odorous. In addition, Valley River receives untreated sewage via McColl Branch which is polluted by the sewage discharged from still another outfall.

The wastes from the two septic tanks and one outfall are discharged to the River above the backwater of Hiwassee Lake. Analyses of samples collected from the river above these discharges of waste at Sampling Station No. 113 show that the water has recovered in large measure from the upstream pollution, under the conditions studied, although the average number of coliform bacteria found, 3,300 (MPN) per 100 ml., indicated full recovery had not taken place. The analyses of samples of water collected from the river below the above pollution from Murphy at Sampling Station No. 114 showed little change in character, other than an increase in numbers of coliform bacteria to an average of 9,300 (MPN) per 100 ml. In both cases the water was well saturated with dissolved oxygen.

The remaining three outfalls discharge untreated sewage either directly or indirectly into Valley River where it becomes the backwater of Hiwassee River. The first such outfall or force main receives sewage from a small pumping station and discharges it to the river at a point upstream from McColl Branch. The second outfall is in fact a broken force main from a larger, inoperative pumping station on McColl Branch which formerly discharged raw sewage directly to Valley River with a P.E. of about 500. The outfall, broken at a point some 1,000 feet above the river, presently discharges this sewage from the wet well into McColl Branch and thence the river. McColl Branch, a

sluggish stream near a populated area, below this waste discharge is fouled with sludge and floating solids which create putrid odors, unsightly conditions, and a possible health hazard. The analyses of samples collected from McColl Branch at Sampling Station No. 114A just above Valley River show that the water on occasion contained as little as 1.2 ppm of dissolved oxygen, had a BOD greater than 30 ppm, and contained as many as 930,000 (MPN) of coliform bacteria per 100 ml. These conditions all indicate a high degree of pollution in McColl Branch. The third outfall discharges directly to Valley River below McColl Branch and just above its mouth.

Sampling Station No. 115 is located at the mouth of Valley River below all the pollution tributary to this river from Murphy. The analyses of samples collected from the river at this point show that the water contained an average dissolved oxygen content of 7.5 ppm and a minimum of 6.1 ppm as contrasted to an average of 8.6 ppm and a minimum of 8.3 ppm at Sampling Station No. 113 above all the pollution in this river from Murphy.

In this connection, it should be noted that the 6.1 ppm dissolved oxygen approaches the required dissolved oxygen content for the satisfactory reproduction of trout which are so prevalent in Valley River. In view of the fact that the flows prevailing in Valley River during the stream studies greatly exceeded those expected during dry periods, it can be anticipated that during such times the dissolved oxygen content of the river in the vicinity of Murphy will be reduced to alarming values with detrimental effects upon the trout. A matter of further concern is the possible effect of the pollution in Valley River upon the bathing waters in Hiwassee Lake below Murphy.

Hiwassee River

Untreated domestic sewage with a P.E. of 1,275 is discharged into Hiwassee River via nine outfalls. Eight of these outfalls discharge into the backwater of Hiwassee Lake where water movement is relatively slow and lake storage provides some additional dilution for the sewage. The uppermost outfall serving 12 people, however, discharges raw sewage into the river opposite and slightly downstream from the Town of Murphy raw water intake and poses a constant threat to the safety of this public water supply. Observations of the lake in the vicinity of the outfalls show the presence of floating sewage solids, a grey sewage-like color in the water, and generally unsightly conditions.

The analyses of samples collected at Sampling Station No. 107, below part of the sewage discharges to Hiwassee River, and at Sampling Station No. 116, below all the pollution originating in the Town of Murphy, show that the chief change in the character of the water is an increase in the numbers of coliform bacteria found therein. The presence of these bacteria in numbers as great as 9,300 (MPN) per 100 ml. in the lake at Sampling Station No. 116 but a short distance above waters used for bathing and water skiing poses a constant threat to the safety of these waters for bathing.

The growing popularity of these waters for bathing and water skiing requires appropriate action by those responsible for pollution. The Town of Murphy should begin now to study this problem and prepare plans for collecting the sewage from the many outfalls for treatment, at a suitable site, designed to protect the downstream bathing waters in Hiwassee Lake and other essential stream uses and at the same time remove the threat to the safety of its own water supply, the public health hazard in McColl Branch, and the possible adverse effects upon the trout in Valley River. The Town should make every effort to connect to its sewerage system all private outfalls now discharging to various streams in the Town limits.

SUMMARY DISCUSSION OF POLLUTION IN SEGMENT IV

The disposal of sewage from the Berkshire Knitting Mills and the Murphy High School is quite satisfactory and should the two sewage treatment plants continue to be well-operated and maintained they should suffice for the time being. The untreated sewage from the Town of Andrews causes a public health hazard in Tatham Creek, increases the numbers of coliform bacteria found in the river and this creek, and during dry seasons poses a threat to the trout in Valley River. The analyses of samples collected from Valley River at Sampling Station No. 108, above the Town of Andrews, indicates that sewage is reaching the river from incidental sources. The untreated sewage from the Town of Murphy threatens the safety of its own water supply as derived from Hiwassee River, the downstream bathing waters in Hiwassee Lake, and the trout in Valley River during dry seasons and creates a public health hazard in McColl Branch. Needless to say that those causing the above adverse conditions should take corrective action at the earliest possible date.

SEGMENT V. HIWASSEE RIVER AND ITS TRIBUTARIES FROM MOUTH OF LAUREL CREEK TO MOUTH OF BEARPAW CREEK

The waters of this Segment are used only for purposes of recreation. Hiwassee River, Hiwassee Lake in this Segment, is used for fishing, boating, bathing, and water skiing and is becoming more popular for these sports as time goes by. It thus becomes apparent that the continued discharge of untreated sewage from the Town of Murphy into Hiwassee Lake is a matter of concern as it is a constant threat to the safety of bathers and water skiers who use the lake but a short distance below this Town for these forms of recreation. Davis Creek and Bald Creek are designated trout waters, while the lake, Nottlely River, and most of the smaller tributaries are used extensively for fishing for other species of fish.

The Grape Creek Recreational Area, with facilities for picnicking and camping, and the Lake Cherokee Camp Ground on the Lake Cherokee Arm of Hiwassee Lake, are located in this Segment.

There is no power generated in this Segment; however, it is of interest to note that Nottley Lake in Georgia, about 2.5 miles south of the North Carolina-Georgia State Line, is a source of hydroelectric power for the Tennessee Valley Authority with provisions for flood control. As for Chatuge Lake, a low-level intake is used to withdraw water for power generation and as a result, the water discharged from the turbine is low in dissolved oxygen during periods of stratification in this rather deep lake. While this is so, the analyses of samples collected from the river at Sampling Station No. 117 in North Carolina, about 2.5 miles north of the State Line and 5 miles below the dam, show that the water contained an average dissolved oxygen content of 4.4 ppm and a minimum content of 3.9 ppm. It is believed, therefore, that fish life can be sustained in this stream below this point and will at least survive in the stream above.

SEGMENT VI. HIWASSEE RIVER AND ITS TRIBUTARIES FROM MOUTH OF BEARPAW CREEK TO HIWASSEE DAM

The waters in this Segment are used for hydroelectric power, fishing, boating, bathing, water skiing, and as the raw water supply for Hiwassee Resort Village.

Hiwassee Lake, formed by Hiwassee Dam, was constructed by the Tennessee

Valley Authority and is operated primarily for the generation of hydroelectric power and for flood control; however, the lake also affords secondary benefits in the form of recreational activities and the storage of raw water used by Hiwassee Resort Village as noted above. The water, after conventional treatment and chlorination, is supplied to a population of 50 in the winter and 350 at the height of the tourist season.

The Tennessee Valley Authority has requested that the raw water intake, presently located in the dam, be relocated with the approval of the State Board of Health. In the event this intake is relocated in the lake, care should be exercised to see that the new intake is installed at a sufficient distance away from the dam as to eliminate any possibility of the water being adversely affected by the inadequately treated sewage from the Village septic tank since water previously released from Hiwassee Lake to Apalachia Lake is returned to the former lake for power purposes.

Copper Creek is a designated trout stream, while the other smaller streams provide species other than trout for the fishing enthusiast.

SEGMENT VII. HIWASSEE RIVER AND ITS TRIBUTARIES FROM HIWASSEE DAM TO MOUTH OF ANDERSON CREEK

This Segment of Hiwassee River does not have any tributaries of consequence. It is used for fishing, boating, and the disposal of effluent from the Hiwassee Resort Village sewage treatment plant. The Powerhouse at Hiwassee Dam secures its domestic water from a spring which is filtered and chlorinated prior to use, while the sewage from the small staff is disposed of in the ground. The only source of pollution is from the Village sewage treatment plant which is described as follows:

Hiwassee Resort Village, formerly known as Hiwassee Dam Village, was purchased by private enterprise from the Tennessee Valley Authority in 1958 but was not used as a resort until after the stream studies were completed. The sewage collection system serves 42 houses, the post office and other buildings. The domestic sewage is treated by means of a septic tank from which the effluent is discharged into Hiwassee River (Apalachia Lake at this point) a short distance below the dam. The septic tank presently serves an estimated winter population of 50 and a maximum population of 350 when the resort is completely filled. This sewage treatment plant is designed for a sewage flow of only 18,000 G.P.D., while the present maximum flow is estimated to be 35,000 G.P.D. It becomes obvious, therefore, that the plant is heavily overloaded at the height of the tourist season.

The Village was not occupied during the period of the stream studies and, accordingly, the samples collected from the lake, above and below the effluent outfall for background information, do not reflect the effects of the plant effluent upon Apalachia Lake. The analyses of these samples do, however, show that the water reaching the downstream area presently used for bathing and water skiing was of satisfactory quality for such purposes at that time.

These analyses also show that the water released from Hiwassee Lake, during periods of hydroelectric power generation, was of such quality as to sustain fish life, at least during the period of the stream studies. A comparison of the analyses of samples collected at Sampling Station No. 118, representing water at the 20-foot depth, and analyses of samples collected at Sampling Station No. 119, 100 feet below the dam, representing water withdrawn through the low-level intake after slight aeration, shows that Hiwassee Lake was stratified.

While this was so, the water from the low-level intake had a minimum dissolved oxygen content of 5.4 ppm which occurred on September 24, 1958. The water at Sampling Station No. 120, 1,100 feet below the dam, had the same value. It is not known from the limited data available if lower dissolved oxygen values would have occurred after September 24; however, the absence of reported fish kills in Apalachia Lake suggests that the water released from the low-level intake in Hiwassee Lake does not adversely affect the quality of the water in the lower lake to the extent as to cause the death of fish, especially when no sewage is being discharged from the Hiwassee Resort Village sewage treatment plant.

In view of the growing popularity of Apalachia Lake below the Village sewage treatment plant for bathing and water skiing and in further consideration of the rather low dissolved oxygen found in the lake water immediately below Hiwassee Dam, it becomes apparent that the management of the Village must provide additional treatment for the sewage if these water sports and the fish found in the lake are to be adequately protected. In designing adequate waste treatment facilities for the Village, due consideration should be given to the use of water from this lake for domestic purposes, after complete treatment, by the Tennessee Valley Authority Powerhouse located in Tennessee below Apalachia Dam.

SEGMENT VIII. HIWASSEE RIVER AND ITS TRIBUTARIES FROM MOUTH OF ANDERSON CREEK TO MOUTH OF NORTH SHOAL CREEK

The waters of Segment VIII are used for bathing, water skiing, boating, fishing, and for the disposal of sewage and kitchen waste from Hiwassee Dam High School.

Hiwassee River (Apalachia Lake) is used for bathing, water skiing, boating, and fishing, while its tributaries are largely used for fishing in respect to recreation. The one source of pollution in this Segment is the effluent from the sewage treatment plant of the above High School which is described as follows:

The Hiwassee Dam High School, with an enrollment of 700, is located on Thompson Branch, a tributary of South Shoal Creek. The sewage and waste from the kitchen are discharged to a secondary type sewage treatment plant consisting of a well-operated septic tank and sand filter from which the effluent is discharged to Thompson Branch. If this waste disposal system continues to receive good operation, it should not adversely affect the bathing waters in Apalachia Lake and should prove to be satisfactory for the time being.

SEGMENT IX. HIWASSEE RIVER AND ITS TRIBUTARIES FROM MOUTH OF NORTH SHOAL CREEK TO APALACHIA DAM

The main stem of Hiwassee River (Apalachia Lake in this Segment) is used as a source of water supply by the Tennessee Valley Authority Powerhouse located on the penstock about eight miles below Apalachia Dam in the State of Tennessee. Raw water for domestic purposes is obtained from the penstock during periods of power generation and receives conventional treatment and chlorination prior to use by the employees. It is for this reason that Class "A-II" is recommended for the main stem of the river in this Segment. During periods when power is not being generated, Hiwassee River is used for the source of raw water as it flows by the Powerhouse.

The main stem is also used for fishing and boating, while its tributaries are used only for fishing. There are no known sources of pollution in this Segment.

The 1958 stream studies did not include the collection of any samples of water from Apalachia Lake in this Segment. In this connection, however, the Tennessee Valley Authority(1) on June 29, 1955, collected a series of samples from the scrollcase at Hiwassee Dam, Apalachia Lake below this Dam, and at the scrollcase at the Apalachia Lake Powerhouse. From the tests made at that time, it was concluded that the water released from Hiwassee Dam flowed through the small pool formed by Apalachia Dam as a density underflow during the warm season of the year. It was found that the water in the scrollcase at Hiwassee Dam had a dissolved oxygen content of 7.2 ppm, while at points in Apalachia Lake, corresponding to Sampling Stations Nos. 119 and 120, the dissolved oxygen content was about 7.4 ppm. There was little change in concentration through the main body of the lake, while at the dam the dissolved oxygen concentrations were 7.7 ppm throughout the moving stratum. There was a slight drop in the penstock leading to the Powerhouse, thought to be due to slime growths on the walls of the penstock, and the dissolved oxygen at the scrollcase at this point was again 7.2 ppm.

The above findings suggest that during the period of late summer and early fall, when water low in dissolved oxygen is being discharged from Hiwassee Lake, there will be little change in the quality of the water in the moving stratum above Apalachia Dam. If this condition does hold true during this critical period, then any pollution discharged to this lake should be treated to the degree that the effluent will not cause any appreciable deterioration of the water therein.

SEGMENT X. HIWASSEE RIVER AND ITS TRIBUTARIES FROM APALACHIA DAM TO NORTH CAROLINA-TENNESSEE STATE LINE

Except during periods of high runoff, the Tennessee Valley Authority so operates its hydroelectric power facilities at Apalachia Dam that no water is released through the spillway. The analyses of samples collected from the river below the dam simply show the quality of pooled water due to slight leakage through the gates or local runoff.

The streams in this Segment are used for fishing. As noted under the previous Segment, the river is used as a source of water supply at the Powerhouse in Tennessee when power is not being generated. In the absence of sources of pollution in this Segment, it is believed that the recommended classification of "C" for the streams in this Segment will provide ample protection for this water supply which is derived from the river at a point some 12 miles below the Dam.

(1) Effects of Storage Impoundments on Water Quality, By Milo A. Churchill, A. M. ASCE, Paper No. 2928 Reprinted from Transactions, Vol. 123, 1958, p. 419, American Society of Civil Engineers.

The only stream tributary to the main stem in North Carolina is Shuler Creek. Although a large percentage of Brushy Creek is in North Carolina, it is tributary to Hiwassee River 0.4 of a mile inside Tennessee. The following streams are also tributary to Hiwassee River in Tennessee as described below and for convenience are included under this Segment:

Hall Creek and Rocky Ford Creek; tributary to Turtletown Creek to Hiwassee River.
Hothouse Creek, Long Branch, Synacia Creek, and Wolf Creek; tributary to Toccoa River to Ocoee River to Hiwassee River.
Potato Creek and North Potato Creek; tributary to Ocoee River to Hiwassee River.

Toccoa River rises in Georgia whence it flows into Tennessee at McCaysville, Georgia-Tennessee, where it becomes Ocoee River and the backwaters of Ocoee Reservoir, No. 3. Ocoee River flows into Hiwassee River 31 miles west of the North Carolina-Tennessee State Line.

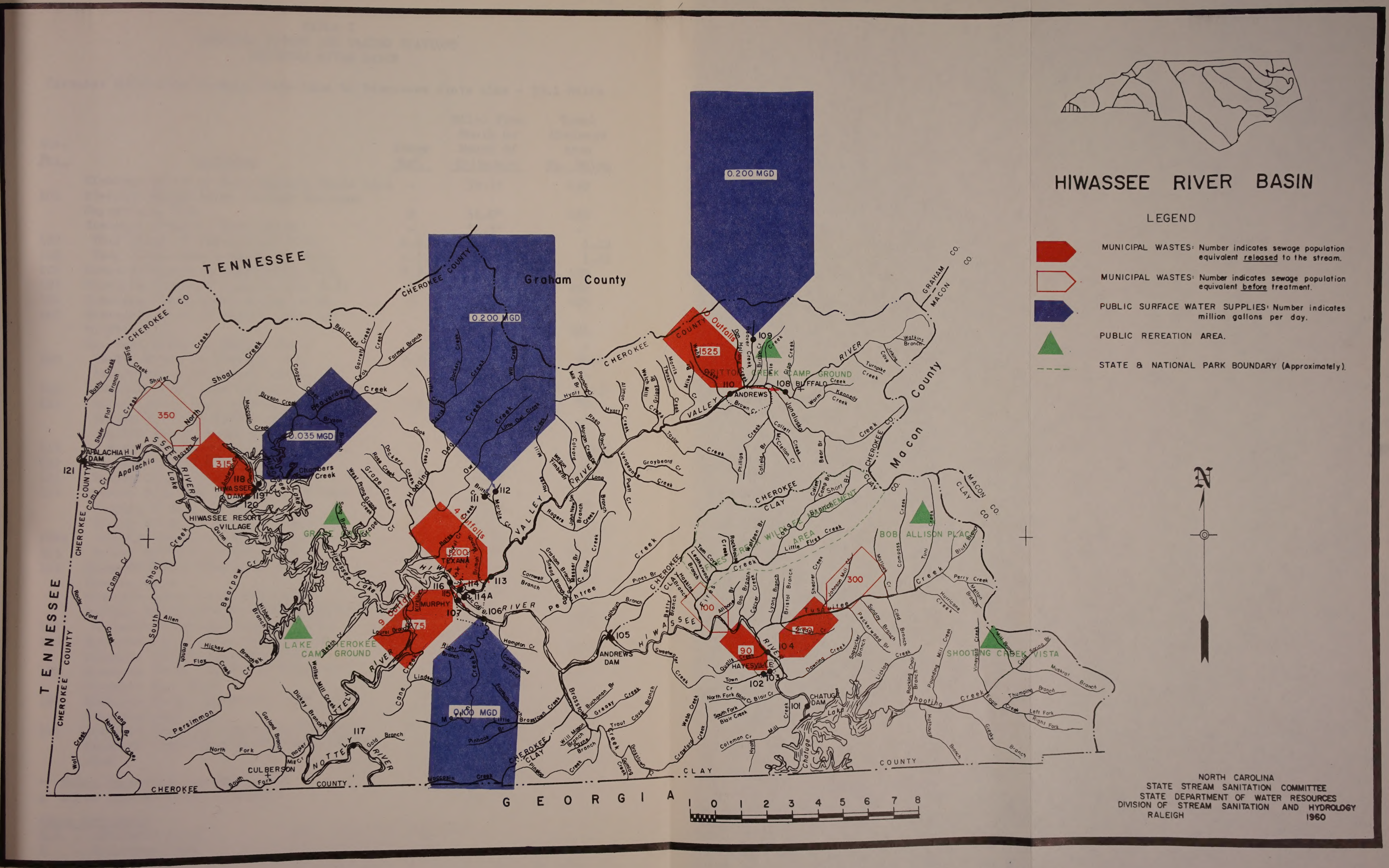

HIWASSEE RIVER BASIN
LEGEND
MUNICIPAL WASTES: Number indicates sewage population equivalent released to the stream.
MUNICIPAL WASTES: Number indicates sewage population equivalent before treatment.
PUBLIC SURFACE WATER SUPPLIES: Number indicates million gallons per day.
PUBLIC REERATION AREA.
STATE & NATIONAL PARK BOUNDARY (Approximately).
NORTH CAROLINA
STATE STREAM SANITATION COMMITTEE
STATE DEPARTMENT OF WATER RESOURCES
DIVISION OF STREAM SANITATION AND HYDROLOGY
RALEIGH
1960
TENNESSEE
GEORGIA
Graham County
Macon County
CHEROKEE CO
CLAY COUNTY
0.200 MGD
0.200 MGD
0.035 MGD
0.100 MGD
350
315
1525
200
275
90
240
300
100
ANDREWS
MURPHY
HAYESVILLE
TEXANA
HIWASSEE DAM
APALACHIA DAM
CHATUGE DAM
ANDREWS DAM
HIWASSEE RESORT VILLAGE
CULBERSON
BUFFALO
BOB ALLISON PLACE
SHOOTING CREEK VISTA
LAKE CHEROKEE CAMP GROUND
HIWASSEE RIVER
VALLEY RIVER
NOTTELY RIVER
4 Outfalls
9 Outfalls
0 1 2 3 4 5 6 7 8

TABLE I
SAMPLING POINTS AND GAGING STATIONS
HIWASSEE RIVER BASIN

Hiwassee River from Georgia State Line to Tennessee State Line - 59.1 Miles

Sta. No.	Location	Stage Ref.	Miles From Mouth Or Mouth Of Tributary	Total Drainage Area Sq. Miles
	Hiwassee River at N.C.-Georgia State Line	-	59.1*	130
101	Hiwassee River below Chatuge Dam near Hayesville, N.C.	R	56.0*	190
	Hiwassee River at Town Creek	-	52.5*	-
102	Town Creek at Hayesville, N.C.	O.S.	0.64a	1.12
103	Town Creek near Hayesville, N.C.	O.S.	0.34a	1.22
104	Hiwassee River at Hayesville, N.C.	R.P.	51.8*	198
105	Hiwassee River at Andrews Dam, N.C.	P.	41.3*	292
106	Hiwassee River above Murphy, N.C.	R	32.3*	406
107	Hiwassee River (Hiwassee Lake) at Murphy, N.C.	-	30.4*	421
	Hiwassee River at Valley River	-	30.1*	-
108	Valley River at Buffalo, N.C.	R.P.	20.7a	20.8
	Valley River at Beaver Creek	-	18.3a	-
109	Beaver Creek near Andrews, N.C.	-	1.9a	1.71
110	Valley River near Andrews, N.C.	R.P.	17.9a	49.4
	Valley River at Marble Creek	-	4.2a	-
	Marble Creek at Brittain Creek	-	1.1a	-
111	Brittain Creek near Murphy, N.C.	-	0.2a	0.41
112	Marble Creek near Murphy, N.C.	-	1.4a	0.83
113	Valley River near Murphy, N.C.	R.P.	1.7a	114
114	Valley River at U.S. Hwy. #19 near Murphy, N.C.	-	0.7a	116
	Valley River at McColl Branch	-	0.2a	-
114A	McColl Branch at Murphy, N.C.	-	0.0a	0.16
115	Valley River at Murphy, N.C.	-	0.1a	117
116	Hiwassee River (Hiwassee Lake) near Texana, N.C.	-	29.9*	540
	Hiwassee River at Nottely River	-	26.3*	-
	Nottely River at N.C.-Georgia State Line	-	17.1	229
117	Nottely River near Murphy, N.C.	R.P.	14.2a	241
118	Hiwassee River (Hiwassee Lake) at Hiwassee Resort Village, N.C.	-	11.1*	968
119	Hiwassee River (Apalachia Lake) at Hiwassee Dam, N.C.	P	10.9*	968
120	Hiwassee River (Apalachia Lake) near Hiwassee Dam, N.C.	P	10.8*	968
121	Hiwassee River at Apalachia Dam, N.C.	-	0.1*	1,018
	Hiwassee River at N.C.-Tennessee State Line	-	0.0	1,108

* Miles from mouth of Main River
a Miles from mouth of Tributary

Stage Reference

R.P. - Reference Point
R - Recording Gage
O.S. - Outside Staff Gage
P - Power Records

Note: Total drainage area in State of Georgia tributary to Hiwassee River is about 444 square miles.

TABLE 2

PUBLIC AND SEMI-PUBLIC SURFACE WATER SUPPLIES

HIWASSEE RIVER BASIN

Location	Pop. 1950	Est. Pop. Served	Est. Consumption M.G.D.	Ownership	Source of Supply	Impounded	Design Capacity M.G.D.	Treatment
Andrews	1,379	1,520	0.200	M	Beaver Creek	Yes	(?)	Filtration and CL_2
Hiwassee Resort Village Winter	*135	50	0.005	P	Hiwassee River	Hiwassee Lake	0.180	Conventional and CL_2
Hiwassee Resort Village Summer		350	0.035					
Murphy	2,433	2,600	0.200	M	Marble Creek(1)	No	0.432	Filtration and CL_2
			0.100	M	Hiwassee River	No	1.000	Conventional and CL_2

*Village occupied by U. S. Navy in 1950.

(1) Includes water from Brittain Creek.

TABLE 3

PUBLIC AND SEMI-PUBLIC GROUND WATER SUPPLIES

HIWASSEE RIVER BASIN

Location	Pop. 1950	Est. Pop. Served	Owner-ship	Est. Consump-tion M.G.D.	No. of Wells	Est. Total Yield M.G.D.	Date Installed	Type of Treatment
Hayesville	356	600	M	0.008 0.058	1 2 Springs	0.060 0.058	1958 1925	None CL_2
Hemmerick Corporation Murphy		95	P	0.003	1	-	-	None
Hiwassee Dam Power House		10	P	-	1 Spring	-	1958	Filtration and CL_2

TABLE 4

POINTS OF SIGNIFICANT SOURCES OF POLLUTION

HIWASSEE RIVER BASIN

Location		Pop. 1950	Est. Pop. Served	Owner-ship	Kind of Waste	Est. Gals. Waste M.G.D.	Type Treat-ment	Design Capa-city M.G.D.	Est. P.E. Before Treatment	Est. P.E. After Treatment	Receiving Stream and Interconnecting Streams to Main River
Andrews		1,379	1,325	M	D.S.	0.155	None	-	1,525	1,525	Valley R. to Hiwassee R.
Hayesville		356	100	M	D.S.	0.010	Primary	0.003	100	90	Town Cr. to Hiwassee R.
			300		D.S.	0.030	Primary	-	300	270	Hiwassee River
Hiwassee Resort Village	Winter	*135	50	P	D.S.	0.005	Primary	0.018	50	32	Hiwassee R. (Apalachian Lake)
	Summer		350		D.S.	0.035			350	315	
Murphy		2,433	1,200	M	D.S.	0.120	None	-	1,200	1,200	Valley River (1)
			1,100		D.S.	0.140	None	-	1,275	1,275	Hiwassee River (Hiwassee Lake)

* Village occupied by U. S. Navy in 1950.

(1) Includes sewage discharged to McColl Branch.

TABLE 5

SCHOOLS

HIWASSEE RIVER BASIN

Name of School	En-roll-ment	Water Supply (Types)	Lunch Room	Type of Treatment Sewage	Receiving Stream and Interconnecting Streams To Main River
Cherokee County					
Andrews School	1,000	Town of Andrews	Yes	Town of Andrews - None	Valley River to Hiwassee River
Andrews Col. School	20	Well	No	Pit Privies	-
Hiwassee Dam High School	700	Well	Yes	Septic Tank - Sand Filter	Thompson Br. to South Shoal Cr. to Hiwassee River
Martin Creek School	300	Well	Yes	Septic Tank - Sand Filter	Martin Cr. to Hiwassee River
Murphy Grade School	1,200	Town of Murphy	Yes	Town of Murphy - None	Hiwassee River
Murphy High School	600	Town of Murphy	Yes	Septic Tank - Sand Filter	Valley River to Hiwassee River
Marble School	350	Well	Yes	Septic Tank - Nit. Field	-
Peachtree School	200	Well	Yes	Septic Tank - Sand Filter	Peachtree Cr. to Hiwassee River
Ranger School	200	Well	-	Septic Tank - Nit. Field	-
Texana School	90	Well	Yes	Septic Tank - Nit. Field	-
Unaka School	150	Well	Yes	Septic Tank - Nit. Field	-
White Church School	250	Well	Yes	Septic Tank - Nit. Field	-
Wolf Creek School	50	Well	-	Septic Tank - Nit. Field	-
Clay County					
Elf School	250	Well	Yes	Septic Tank - Nit. Field	-
Hayesville High School	900	Town of Hayesville	Yes	Septic Tank - Sand Filter	Town Cr. to Hiwassee River
Ogden School	300	Well	Yes	Septic Tank - Nit. Field	-
Shootin Creek School	350	Well	Yes	Septic Tank - Nit. Field	-

TABLE 6

PRISON CAMPS

HIWASSEE RIVER BASIN

Location	Camp Capacity	No. In-mates	No. Per-sonnel	Total Popu-lation	Water Supply Type	Type Treatment (Sewage)	Receiving Stream Tributary to Main River
Cherokee County							
N. C. Prison Unit #141	100	81	16	97	Well	Septic Tank - Sand Filter	McCombs Br. to Hiwassee River

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 101 - Located on Hiwassee River 1,100 feet below Chatuge Dam. Drainage Area (sq. mi.) 190

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-day B.O.D. ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-29	T	1345	1,350	17	8	10	6.6	0	11	18	0	5.4	55	1.6	15,000	3.6
8-4	M	1600	1,360	16	8	9	6.7	0	11	7	0.5	4.8	48	2.2	20,000	43
8-15	F	1015	1,440	20	-	7	6.3	0	25	6	0	3.5	38	2.0	19,000	930
8-19	T	0745	1,450	20	6	5	6.8	0	8	6	1	3.1	34	1.8	18,000	9.1
8-28	Th	1200	1,410	22	5	9	6.6	0	11	8	0	2.3	26	0.9	8,600	93
9-5	F	0745	1,340	23	12	15	7.2	0	15	7	0	2.4	28	3.1	28,000	9.1
9-10	W	1800	1,350	25	10	15	7.0	0	13	7	0	3.7	44	3.6	33,000	9.1
9-23	T	1200	10*	24*	14*	15*	6.8*	0*	12*	0*	0*	6.3*	74*	1.2*	81*	43*
Average			1,390	20	8	10	6.3 to 7.2	0	13	8	0	3.6	39	2.2	20,000	160

*Excluded from average because of abnormal flow condition.

Station 102 - Located on Town Creek above sewage effluent outfall at Hayesville. Drainage Area (sq. mi.) 1.12

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-day B.O.D. ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-29	T	1410	1.5	22	22	30	6.6	0	11	8	1	7.6	86	2.2	22	430
8-4	M	1700	1.4	21	11	15	6.6	0	10	10	1	8.2	91	1.6	15	9,300
8-15	F	1035	1.4	20	-	7	6.7	0	35	8	2	8.3	91	2.1	20	4,600
8-19	T	0810	1.4	18	10	10	6.8	0	16	8	0.5	8.8	92	1.2	11	930
8-28	Th	1220	1.1	20	7	9	6.6	0	9	6	0	8.4	92	1.4	10	1,500
9-5	F	0730	0.8	16	15	9	7.2	0	11	6	0	8.8	88	1.9	10	430
9-10	W	1810	0.6	20	11	20	6.8	0	10	6	0.5	8.3	91	2.2	9	9,300
9-23	T	1225	1.2	20	16	20	6.7	0	10	7	0	8.4	92	1.2	10	1,500
Average			1.2	20	13	15	6.6 to 7.2	0	14	7	1	8.4	90	1.7	13	3,500

TABLE 7

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 103 - Located on Town Creek below point of discharge of sewage effluent from Hayesville. Drainage Area (sq. mi.) 1.22

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-Day B.O.D. ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-29	T	1450	1.5	22	24	20	6.7	0	14	10	2	7.1	80	4.4	45	23,000
8-4	M	1630	1.2	22	12	10	6.5	0	10	11	0.5	7.2	82	6.6	53	93,000
8-15	F	1055	1.2	20	-	10	6.6	0	30	9	1	7.4	81	4.5	36	460,000
8-19	T	0845	1.2	18	9	9	6.7	0	4	8	0.5	7.9	83	3.2	26	230,000
8-28	Th	1245	1.1	21	5	5	6.6	0	12	8	0.5	7.5	83	2.7	20	93,000
9-5	F	0820	1.0	17	12	10	6.8	0	11	7	0.5	8.2	84	2.9	20	460,000
9-10	W	1830	0.8	20	13	20	6.7	0	16	9	2	7.5	82	4.3	23	43,000
9-23	T	1235	1.0	20	16	35	6.8	0	10	10	1	7.1	77	5.7	38	93,000
Average			1.1	20	13	15	6.5 to 6.8	0	13	9	1	7.5	82	4.3	33	190,000

Station 104 - Located on Hiwassee River below all pollution from Hayesville. Drainage Area (sq. mi.) 198

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-Day B.O.D. ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-29	T	1520	1,200	17	7	7	6.5	0	9	7	0.5	6.4	66	1.3	11,000	93
8-4	M	1550	1,220	17	5	10	6.3	0	8	7	0.5	6.2	64	1.1	9,100	500
8-15	F	1120	1,090	21	-	5	6.7	0	25	7	2	5.1	57	1.2	8,800	330
8-19	T	0920	1,080	20	8	10	6.5	0	8	8	0.5	5.3	58	1.4	10,000	680
8-28	Th	1300	1,240	22	9	10	6.5	0	13	8	0	4.5	51	1.1	9,200	330
9-5	F	0845	1,120	22	12	10	6.8	0	10	7	1	4.2	47	1.7	13,000	1,200
9-10	W	1900	1,180	26	10	30	6.5	0	11	7	0	5.2	63	0.6	4,800	43
9-23	T	1255	35*	24*	13*	15*	6.9*	0*	13*	10*	2*	8.1*	95*	1.9*	450*	11000*
Average			1,160	21	9	10	6.3 to 6.9	0	12	7	1	5.3	58	1.2	9,400	450

*Excluded from average because of abnormal flow.

TABLE 7

ANALYTICAL RESULTS
HIWASSEE RIVER BASIN

Station 105 - Located on Hiwassee River above Andrews Dam. Drainage Area (sq. mi.) 292

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D.O. ppm	D.O. % Sat.	5-Day B.O.D. ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.	105 Tailrace (1) Temp.	105 Tailrace (1) D.O.	105 Tailrace (1) % Sat.
7-29	T	1520	1,886	21	9	9	6.7	0	9	7	1	8.5	95	1.6	20,000	230	22	8.6	97
8-4	M	1415	1,786	21	5	9	6.5	0	10	7	0.5	8.1	90	1.6	19,000	230	19	8.4	90
8-15	F	1215	1,000	23	-	9	6.7	0	30	6	2	8.1	93	1.2	8,100	930	21	8.2	91
8-19	T	1000	*	23*	6*	7*	6.8*	0*	6*	8*	0.5*	7.7*	89*	1.7*	-*	930*	23*	7.6*	88*
8-28	Th	0800	70	21	7	9	6.6	0	10	8	0.5	7.1	79	1.5	710	930	21	6.9	77
9-5	F	0925	80	23	9	10	6.6	0	12	8	0	7.3	84	1.3	700	150	22	7.2	82
9-10	W	1940	792	23	10	20	6.5	0	9	6	0	8.1	93	1.5	8,000	43	23	8.0	92
9-23	T	1345	*	21*	21*	20*	6.8*	0*	7*	6*	0.5*	8.1*	90*	-	-	2,100*	22*	8.1*	92*
Average			936	22	8	10	6.5 to 6.7	0	13	7	1	7.9	89	1.5	9,400	420	21	7.9	88

* Excluded from average as hydro-electric project was not in operation and flow was leakage only.

(1) Sample collected in tailrace 100 feet below dam.

Station 106 - Located on Hiwassee River above Murphy's water intake and above all pollution from Murphy. Drainage Area (sq. mi.) 406

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D.O. ppm	D.O. % Sat.	5-Day B.O.D. ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1120	1,830	24	7	10	7.1	0	10	6	0.5	8.1	95	3.7	46,000	2,200
8-5	T	1655	1,460	21	8	15	7.5	0	14	7	0.5	8.4	93	3.3	33,000	930
8-14	Th	0940	399	23	7	20	6.8	0	8	8	0	8.5	98	1.7	4,600	63
8-18	M	0720	214	22	9	10	7.3	0	8	9	0.5	8.5	96	1.6	2,300	330
8-29	F	1430	1,370	21	7	10	7.4	0	12	8	0	8.2	91	0.9	8,300	680
9-3	W	1150	270	23	11	10	7.5	0	11	8	0	8.4	97	0.9	1,600	1,500
9-9	T	1855	1,570	23	9	9	7.2	0	12	8	0	7.9	91	0.3	3,200	93
9-24	W	1420	135	25	14	15	7.0	0	10	8	0.5	8.2	98	0.6	550	430
Average			906	23	9	12	6.8 to 7.5	0	11	8	0	8.3	95	1.6	12,000	780

TABLE 7

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

<u>Station 107</u> - Located on Hiwassee River (Hiwassee Lake) below eight untreated sewage outfalls from Murphy. Drainage Area (sq. mi.) 421

Date Collected 1958	Day	Time	Mean Daily Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-Day B.O.D. ppm 20°C	5-Day B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1200	1,390	24	8	10	6.9	0	10	7	0.5	7.8	91	2.2	21,000	1,500
8-5	T	1620	1,330	28	6	15	7.1	0	11	9	0	7.7	97	2.3	21,000	760
8-14	Th	1000	1,150	25	5	9	7.5	0	11	12	0	7.8	93	1.5	12,000	<36*
8-18	M	0800	530	24	3	5	6.5	0	6	9	0.5	7.7	91	1.8	6,400	760
8-29	F	1445	1,130	23	5	9	6.5	0	13	7	0	7.6	88	0.7	5,300	3,900
9-3	W	1200	1,170	24	10	9	6.9	0	11	9	0	7.6	89	0.3	2,400	15,000
9-9	T	1820	760	25	7	9	6.6	0	9	7	0	8.2	98	1.2	6,200	6,000
9-24	W	1230	530	24	16	20	6.5	0	11	11	0.5	8.0	94	1.3	4,700	4,300
Average			1,140	25	8	10	6.5 to 7.5	0	10	9	0	7.8	93	1.4	9,900	4,600

*Excluded from average - indeterminate.

<u>Station 108</u> - Located on Valley River above all pollution from Andrews. Drainage Area (sq. mi.) 20.8

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-Day B.O.D. ppm 20°C	5-Day B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-29	T	1910	37	21	8	7	6.6	0	11	10	2	7.9	88	1.2	300	2,300
8-4	M	1350	34	21	6	5	6.8	0	10	11	1	8.1	90	1.5	340	9,300
8-15	F	1600	22	23	-	3	7.1	0	25	13	0.5	8.0	92	1.2	180	240,000
8-19	T	1205	24	20	5	5	6.8	0	8	14	0	8.6	94	0.7	110	2,300
8-28	Th	0825	18	17	10	9	6.9	0	14	13	0	9.0	92	1.1	130	9,300
9-5	F	1035	14	19	7	10	6.7	0	16	12	0.5	9.0	96	1.3	120	4,300
9-10	W	1005	13	17	5	20	6.5	0	16	12	0	9.5	98	1.9	170	230
9-23	T	1600	14	22	7	15	6.7	0	15	13	0.5	8.4	95	0.9	85	430
Average			22	20	7	9	6.5 to 7.1	0	14	12	1	8.6	93	1.2	180	34,000

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 109 - Located on Beaver Creek above Andrews Water Intake. Drainage Area (sq. mi.) 1.71

Date Col-lected 1958	Day	Time	Dis-charge cfs	Temp. °C	True Color Units	Tur-bid-ity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chlo-ride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-29	T	1840		20	5	15	6.5	0	5	10	2	8.4	92	1.0		<3.6
8-4	M	1305		21	5	3	6.4	0	5	6	1	8.5	95	1.3		43
8-15	F	1535		22	-	3	6.7	0	25	4	1	8.2	93	0.4		9.1
8-19	T	1125		18	5	3	6.7	0	4	7	0.5	7.5	79	0.4		23
8-28	Th	0900		18	11	5	6.7	0	7	4	0.5	8.7	91	1.3		230
9-10	W	1040		17	7	25	6.6	0	7	4	0	9.0	92	0.6		<3.6
Average				19	7	9	6.4 to 6.7	0	9	6	1	8.4	90	0.8		<52

Station 110 - Located on Valley River below all pollution from Andrews. Drainage Area (sq. mi.) 49.4

Date Col-lected 1958	Day	Time	Dis-charge cfs	Temp. °C	True Color Units	Tur-bid-ity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chlo-ride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-29	T	1740	82	24	11	10	6.7	0	11	12	2	7.9	93	2.0	1,100	460,000
8-4	M	1230	76	21	7	15	6.5	0	12	12	0.5	8.2	91	2.4	1,200	93,000
8-15	F	1515	50	24	-	7	7.1	0	30	12	0.5	8.1	95	2.4	810	110,000
8-19	T	1100	49	21	5	3	6.7	0	4	15	1	8.7	97	2.4	790	23,000
8-28	Th	0915	39	18	5	7	6.7	0	14	13	0	8.6	90	1.3	340	43,000
9-5	F	1010	26	19	7	7	6.7	0	15	12	0.5	9.2	98	2.6	460	43,000
9-10	W	1015	28	17	6	20	6.9	0	14	14	0	9.3	95	1.7	320	150,000
9-23	T	1630	31	23	8	10	6.9	0	18	14	0.5	8.1	93	1.7	360	43,000
Average			48	21	7	10	6.5 to 7.1	0	15	13	1	8.5	94	2.1	670	120,000

TABLE 7

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 111 - Located on Brittain Creek above Murphy's water intake. Drainage Area (sq. mi.) 0.41

Date Col-lected 1958	Day	Time	Temp. °C	True Color Units	Tur-bid-ity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chlo-ride ppm	D. O. ppm	D. O. % Sat.	5-Day B.O.D. ppm 20°C	Coliform M.P. N. per 100 ml.
7-29	T	1130	21	7	9	6.5	0	6	11	0.5	8.0	89	1.6	21
8-4	M	0830	18	9	7	6.4	0	6	8	1	8.0	84	2.2	230
8-15	F	1400	18	-	5	6.3	0	25	8	0.5	8.1	85	0.5	3.6
8-19	T	1320	19	5	3	7.4	0	6	7	0	8.3	89	0.4	15
8-28	Th	1040	18	5	7	6.5	0	6	3	0	8.5	89	0.9	230
9-10	W	1130	18	6	25	7.1	0	7	6	0	8.5	89	0.7	3.6
Average			19	6	9	6.3 to 7.4	0	9	7	0	8.2	88	1.1	84

Station 112 - Located on Marble Creek above Murphy's water intake. Drainage Area (sq. mi.) .83

Date Col-lected 1958	Day	Time	Temp. °C	True Color Units	Tur-bid-ity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chlo-ride ppm	D. O. ppm	D. O. % Sat.	5-Day B.O.D. ppm 20°C	Coliform M.P. N. per 100 ml.
7-29	T	1140	21	9	10	6.5	0	6	10	1	7.9	88	2.6	7.3
8-4	M	0850	18	8	7	6.0	0	3	8	0.5	8.0	84	1.0	230
8-15	F	1350	18	-	3	6.4	0	20	7	1	8.2	86	0.4	230
8-19	T	1330	19	6	3	7.3	0	4	7	1	8.1	87	0.4	43
8-28	Th	1045	18	5	5	6.5	0	6	4	0	8.5	89	0.8	230
9-10	W	1140	18	5	15	6.5	0	6	7	0	8.8	92	0.7	<3.6
Average			19	7	7	6.0 to 7.3	0	8	7	1	8.3	88	1.0	120

TABLE 7

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 113 - Located on Valley River above all pollution from Murphy. Drainage Area (sq. mi.) 114

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1330	224	23	6	9	7.2	0	17	13	1	8.3	96	2.6	3,900	4,300
8-5	T	1710	233	23	5	10	7.9	0	20	6	0.5	8.9	103	2.1	3,200	9,300
8-14	Th	1130	222	23	11	15	7.1	0	23	25	0	8.5	98	1.8	2,700	930
8-18	M	0930	138	23	6	7	6.6	0	10	16	0.5	8.6	99	3.3	3,100	4,300
8-29	F	1510	78	20	11	10	6.6	0	20	18	0.5	8.5	93	1.0	530	230
9-3	W	1000	65	20	9	9	7.0	0	21	16	1	8.5	93	0.8	350	2,100
9-9	T	1910	57	21	9	10	6.8	0	17	17	0.5	9.1	101	1.4	540	4,300
9-24	W	1200	70	22	8	5	6.5	0	20	16	1	8.6	97	0.6	280	930
Average			136	22	8	9	6.5 to 7.9	0	19	16	1	8.6	98	1.7	1,800	3,300

Station 114 - Located on Valley River below Town of Murphys two septic tank outfalls and one untreated sewage outfall. Drainage Area (sq. mi.) 116

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1350	228	24	5	9	7.1	0	17	13	1	8.3	97	1.7	2,600	4,900
8-5	T	1720	237	24	10	15	7.1	0	18	18	0.5	8.6	100	3.0	4,800	9,300
8-14	Th	1150	226	23	13	15	6.8	0	24	23	0	7.3	84	1.8	2,700	23,000
8-18	M	0950	140	23	6	9	6.5	0	8	10	0.5	7.7	89	3.0	2,800	11,000
8-29	F	1525	79	23	10	7	6.9	0	20	17	0.5	7.8	90	0.8	430	8,400
9-3	W	1220	66	22	9	10	6.8	0	22	17	0	7.7	87	0.8	360	3,300
9-9	T	1920	58	21	9	10	6.7	0	18	16	0	8.8	98	1.7	670	14,000
9-24	W	1400	71	23	8	5	6.9	0	19	18	0.5	9.2	106	0.8	380	430
Average			138	23	9	10	6.5 to 7.1	0	18	17	0	8.2	94	1.7	1,800	9,300

TABLE 7

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 114-A - Located on McColl Branch below Murphy's main sewage pumping station. Drainage Area (sq. mi.) .16

Date Col-lected 1958	Day	Time	Dis-charge cfs	Temp. °C	True Color Units	Tur-bid-ity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chlo-ride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
8-29	F	0820		23	10	7	6.8	0	18	17	1	3.2	37	3.8		930,000
9-3	W	1230		25	14	15	6.5	0	24	17	4	4.5	54	7.5		930,000
9-9	T	1935		26	6	5	6.6	0	10	8	0	8.4	102	3.1		43,000
9-24	W	1315		24	75	120	6.6	0	84	43	14	1.2	14	>30*		430,000
Average				25	26	35	6.5 to 6.8	0	34	21	5	4.3	52	4.8		580,000

*Excluded from average - indeterminate.

Station 115 - Located on Valley River below all pollution in this stream from Murphy. Drainage Area (sq. mi.) 117

Date Col-lected 1958	Day	Time	Dis-charge cfs	Temp. °C	True Color Units	Tur-bid-ity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chlo-ride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1410	230	24	6	10	6.8	0	12	14	1	6.1	72	2.3	3,600	9,300
8-5	T	1530	239	28	5	15	7.1	0	17	9	2	7.5	95	2.1	3,400	750
8-14	Th	1210	228	25	4	5	8.3	0	14	10	0	7.8	93	1.0	1,500	430
8-18	M	1000	142	24	3	5	6.7	0	8	7	0.5	7.8	91	2.1	2,000	4,300
8-29	F	0800	80	25	4	9	7.1	0	20	15	0.5	7.5	89	2.2	1,200	>11,000**
9-3	W	1240	67	25	8	10	6.6	0	19	19	0	7.0	84	1.7	770	24,000
9-9	T	1940	58	26	7	10	6.8	0	10	10	0.5	8.3	101	1.8	700	4,300
9-24	W	1320	72	23	10	15	7.0	0	23	22	0.5	8.0	92	1.5	730	9,300
Average			140	25	6	10	6.6 to 8.3	0	15	13	1	7.5	90	1.8	1,700	7,500

**Excluded from average - indeterminate.

TABLE 7

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 116 - Located on Hiwassee River (Hiwassee Lake) below all pollution from Murphy. Drainage Area(sq. mi.) 540

Date Collected 1958	Day	Time	Mean Daily Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1440	1,600	24	7	10	6.7	0	10	13	1	7.6	89	2.4	26,000	6,800
8-5	T	1510	1,600	28	4	15	7.1	0	13	8	0	7.5	94	1.2	13,000	330
8-14	Th	1240	1,400	25	4	7	7.1	0	10	11	0	7.7	92	1.3	12,000	330
8-18	M	1040	670	24	3	5	6.5	0	6	8	0.5	7.8	91	1.7	7,700	2,600
8-29	F	0840	1,200	24	7	10	7.1	0	11	11	0	7.5	88	1.7	14,000	>6,700*
9-3	W	1250	1,200	26	5	10	7.2	0	14	7	0	7.2	88	0.9	7,300	1,400
9-9	T	0645	820	24	8	7	6.6	0	11	8	0	8.4	99	1.7	9,400	9,300
9-24	W	1330	600	24	15	15	6.5	0	11	9	0.5	8.0	94	1.2	4,900	1,400
Average			1,100	25	7	10	6.5 to 7.2	0	11	9	0	7.7	92	1.5	12,000	3,200

*Excluded from average - indeterminate.

Station 117 - Located on Nottely River to define condition of water entering North Carolina from Georgia. Drainage Area (sq. mi.) 241

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-29	T	1245	1,390	21	21	15	6.5	0	11	11	1	4.9	55	1.1	10,000	3.6
8-4	M	1130	1,220	19	17	50	6.2	0	11	14	3	4.8	51	1.3	11,000	930
8-15	F	1435	1,520	23	-	20	6.3	0	15	7	2	4.1	47	1.0	10,000	930
8-19	T	1500	1,480	23	12	20	7.1	0	6	8	0.5	4.0	46	1.6	16,000	93
8-28	Th	0700	1,600	23	7	35	6.5	0	12	8	0	4.0	46	0.8	26,000	2,400
9-5	F	0655	1,430	23	13	65	6.7	0	11	10	1	3.9	45	0.9	8,700	93
9-10	W	0900	1,460	24	11	50	6.5	0	9	7	0	5.1	60	0.9	8,900	43
9-23	T	1515	490**	20**	39**	65**	6.8**	0**	10**	11**	0.5**	5.5**	60**	1.8**	6,000**	2,400**
Average			1,440	22	14	36	6.2 to 7.1	0	11	9	1	4.4	50	1.1	13,000	640

**Excluded from average because of abnormal flow.

TABLE 7

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 118 - Located on Hiwassee River (Hiwassee Lake) to define quality of Hiwassee Village water supply. Drainage Area (sq. mi.) 968

Date Col- lected 1958	Day	Time	Dis- charge cfs	Temp. °C	True Color Units	Tur- bid- ity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chlo- ride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1630	-	30	3	20	6.8	0	8	11	1	7.3	96	1.2	-	<3.6
8-5	T	1340	-	28	5	10	7.0	0	9	8	1	7.8	98	1.9	-	230
8-14	Th	1500	-	28	3	9	6.6	0	7	6	0	7.9	100	1.3	-	430
8-18	M	1230	-	29	1	5	6.5	0	6	5	0.5	8.1	103	1.2	-	<3.6
8-29	F	0930	-	28	7	5	6.8	0	8	5	0	8.4	106	0.9	-	930
9-3	W	1510	-	28	2	7	7.1	0	9	10	0	8.2	104	0.8	-	3.6
9-9	T	0730	-	25	5	7	6.6	0	9	8	0.5	8.2	98	1.0	-	<3.6
9-24	W	1615	-	26	4	3	6.5	0	8	8	1	8.2	100	0.6	-	230
Average				28	4	8	6.5 to 7.1	0	8	8	1	8.0	101	1.1		<230

Station 119 - Located on Hiwassee River below Hiwassee Dam and above point of discharge of effluent from Hiwassee Village sewage treatment plant. (Treatment plant not in operation during study). Drainage Area (sq. mi.) 968

Date Col- lected 1958	Day	Time	Dis- charge cfs	Temp. °C	True Color Units	Tur- bid- ity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chlo- ride ppm	D. O. ppm	D. O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1540	5,250	15	5	3	6.5	0	10	14	2	7.2	71	0.6	21,000	3.6
8-5	T	1245	3,250	16	6	10	6.6	0	10	7	0.5	6.9	69	1.8	39,000	93
8-14	Th	1410	3,275	18	4	3	6.5	0	9	7	0	6.9	72	1.2	27,000	<3.6
8-18	M	1140	3,255	19	3	5	5.8	0	8	9	0.5	6.5	70	1.2	26,000	<3.6
8-29	F	1000	3,229	20	5	7	6.5	0	14	8	0.5	6.4	70	1.0	22,000	430
9-3	W	1440	3,215	21	4	7	6.5	0	11	10	0	6.4	71	0.8	17,000	<3.6
9-9	T	0800	3,283	19	5	15	6.5	0	10	9	0	5.7	61	1.1	24,000	9.1
9-24	W	1530	3,408	14	4	3	6.5	0	11	10	0	5.4	53	0.7	16,000	9.1
Average			3,520	18	5	7	5.8 to 6.6	0	10	9	0	6.4	67	1.1	24,000	<69

ANALYTICAL RESULTS

HIWASSEE RIVER BASIN

Station 120 - Located on Hiwassee River below point of sewage effluent discharge from Hiwassee Dam sewage treatment plant. (Treatment plant not in operation during study). Drainage Area (sq. mi.) 968

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D.O. ppm	D.O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1600	5,240	15	5	10	6.5	0	8	10	2	7.2	71	0.6	21,000	<3.6
8-5	T	1235	3,250	16	5	15	6.7	0	11	9	0	6.4	64	1.0	22,000	230
8-14	Th	1420	3,275	18	4	7	6.5	0	8	9	0.5	7.0	73	1.3	29,000	3.6
8-18	M	1200	3,255	19	3	3	5.8	0	2	10	0.5	6.5	70	0.7	15,000	<3.6
8-29	F	1015	3,250	20	10	9	6.5	0	12	8	0	6.3	69	0.6	13,000	23
9-3	F	1450	3,283	22	2	7	6.5	0	10	11	1	6.0	68	1.3	29,000	<3.6
9-9	T	0815	3,283	19	5	9	6.5	0	8	9	0	5.7	61	1.2	27,000	<3.6
9-24	W	1535	3,408	14	4	3	6.5	0	12	12	0.5	5.4	53	0.5	12,000	3.6
Average			3,531	18	5	8	5.8 to 6.7	0	9	10	1	6.3	66	0.9	21,000	<55

Station 121 - Located on Hiwassee River below Apalachia Dam. Drainage Area (sq. mi.) 1,018

Date Collected 1958	Day	Time	Discharge cfs	Temp. °C	True Color Units	Turbidity Units	pH Range	Alkalinity Phenol ppm	Alkalinity Total ppm	Hardness as $CaCO_3$ ppm	Chloride ppm	D.O. ppm	D.O. % Sat.	5-Day ppm 20°C	B.O.D. lbs/day 25°C	Coliform M.P.N. per 100 ml.
7-28	M	1830		33	9	7	7.2	0	59	13	2	8.2	112	2.5		43
8-5	T	1100		26	12	15	7.2	0	64	67	1	9.2	112	1.5		23
8-14	Th	1700		34	8	15	7.2	0	60	54	0.5	9.8	136	2.2		23
8-18	M	1430		34	15	5	6.3	0	34	68	1	10.5	145	2.1		430
Average				32	11	10	6.3 to 7.2	0	54	51	1	9.4	126	2.1		130

EXPLANATION OF TABLE 8, RECOMMENDED CLASSIFICATIONS

The tentative recommended classifications of the surface waters of the Hiwassee River Basin are given in Table 8. These recommendations are considered to represent the best usages of the streams in the best interest of the public. They are submitted to all concerned for consideration at the public hearing and to the State Stream Sanitation Committee in its determination of the final classifications to be assigned.

* Any natural stream not noted in Table 8 will carry the same classification as the stream to which it is tributary.

Key To Abbreviations Used In Table

Agri.	-	Agriculture	P	-	Polluted
DS	-	Domestic Sewage	PA	-	Populated Area
F	-	Farmlands	Rec.	-	Recreation
GP	-	Grossly Polluted	SP	-	Slightly Polluted
HDA	-	Highly Developed Area	W	-	Woodlands
IW	-	Industrial Waste	WS	-	Water Supply
N	-	Natural	WD	-	Waste Disposal

Brief Explanation of Water Classifications

Fresh Surface Waters

A-I - Water supply from uninhabited watersheds requiring only approved disinfection.

A-II - Water supply with approved complete treatment.

B - Bathing and recreation.

C - Fish and Wildlife propagation.

D - Agriculture, including irrigation and livestock watering, drainage and industrial cooling and process water supply.

E - Navigation and disposal of sewage, industrial waste and other wastes with the provision that such disposal will not create an offensive condition.

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
I. Hiwassee River (Chatuge Lake below Elevation 1928) from N.C.--Georgia State line to Chatuge Dam.	W	N	Rec.	Rec.	B	
A. Upper Bell Creek (North Carolina portion)	W	N	Fishing	Fishing	C	
B. Wood Creek (North Carolina portion)	W	N	Fishing	Fishing	C	
C. Sneaking Creek (North Carolina portion)	W	N	Fishing	Fishing	C	
D. Davenport Branch	W	N	Fishing	Fishing	C	
E. Shooting Creek	WF	N	Fishing	Fishing	C	Trout Waters
1. Muskrat Branch	WF	N	Fishing	Fishing	C	
a. Jake Branch	W	N	Fishing	Fishing	C	
2. Thompson Creek	WF	N	Fishing	Fishing	C	
a. Locust Log Branch	W	N	Fishing	Fishing	C	
3. Mill Creek	W	N	Fishing	Fishing	C	
4. Lynch Branch	W	N	Fishing	Fishing	C	
5. Vineyard Creek	W	N	Fishing	Fishing	C	
6. Eagle Fork Creek	WF	N	Fishing	Fishing	C	
a. Ledford Creek	W	N	Fishing	Fishing	C	
b. Dave Barrett Creek	W	N	Fishing	Fishing	C	
(1) Barrett Branch	W	N	Fishing	Fishing	C	
(2) Loggy Branch	W	N	Fishing	Fishing	C	
c. Thumping Creek	WF	N	Fishing	Fishing	C	
7. Grisky Creek	WF	N	Fishing	Fishing	C	
a. Bethabara Creek	WF	N	Fishing	Fishing	C	
b. Nattie Branch	W	N	Fishing	Fishing	C	
c. Burch Cove Branch	W	N	Fishing	Fishing	C	
8. Pounding Mill Creek	WF	N	Fishing	Fishing	C	
a. Copper Mine Branch	WF	N	Fishing	Fishing	C	
9. Hothouse Branch	WF	N	Fishing	Fishing	C	
a. Cherry Cove Branch	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
F. Rocking Chair Branch	WF	N	Fishing	Fishing	C	
G. Laurel Branch	WF	N	Fishing	Fishing	C	
H. Penland Branch	WF	N	Fishing	Fishing	C	
I. Needmore Branch	WF	N	Fishing	Fishing	C	
J. Stillhouse Branch	WF	N	Fishing	Fishing	C	
K. Licklog Creek	WF	N	Fishing	Fishing	C	
L. Patterson Branch	WF	N	Fishing	Fishing	C	
M. Crawford Branch	WF	N	Fishing	Fishing	C	
N. Byers Branch	WF	N	Fishing	Fishing	C	
II. Hiwassee River from Chatuge Dam to Andrews Dam	WF & PA	N--SP	Fishing	Fishing	C	Effluent from Hayesville sewage treatment plant.
A. Hyatt Mill Creek	WF	N	Fishing	Fishing	C	
1. Coleman Creek	WF	N	Fishing	Fishing	C	
B. Blair Creek	WF	N	Agri.	Agri.	D	
1. North Fork Blair Creek	WF	N	Fishing	Fishing	C	
a. Kimsey Branch	WF	N	Fishing	Fishing	C	
b. Loving Spring Branch	WF	N	Fishing	Fishing	C	
c. Carter Branch	WF	N	Fishing	Fishing	C	
2. South Fork Blair Creek	WF	N	Fishing	Fishing	C	
C. Drowning Creek	WF	N	Fishing	Fishing	C	
1. Bob Prater Branch	WF	N	Fishing	Fishing	C	
2. John Reese Branch	WF	N	Fishing	Fishing	C	
3. Patterson Mill Creek	WF	N	Fishing	Fishing	C	
D. Town Creek	WF & PA	P	WD	Agri.	D	Effluent from Hayesville sewage treatment plant.
E. Qualls Creek	WF	N	Fishing	Fishing	C	
F. Tusquitee Creek	WF	N	Fishing	Fishing	C	Trout Waters
1. Bluff Creek	W	N	Fishing	Fishing	C	
2. Perry Creek	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Pro-posed Class	Comments
a. Mill Creek	W	N	Fishing	Fishing	C	
b. Passmore Creek	W	N	Fishing	Fishing	C	
3. Mull Branch	W	N	Fishing	Fishing	C	
4. Hurricane Creek	W	N	Fishing	Fishing	C	
5. Big Tuni Creek	W	N	Fishing	Fishing	C	Trout Waters
a. Chestnut Branch	W	N	Fishing	Fishing	C	
b. Boone Branch	W	N	Fishing	Fishing	C	
c. Steve Branch	W	N	Fishing	Fishing	C	
d. Long Branch	W	N	Fishing	Fishing	C	
e. Little Tuni Creek	W	N	Fishing	Fishing	C	
6. Chairmaker Branch	W	N	Fishing	Fishing	C	
7. Compass Creek	W	N	Fishing	Fishing	C	
8. Matlock Creek	W	N	Fishing	Fishing	C	
a. Julie Branch	W	N	Fishing	Fishing	C	
9. Cold Branch	W	N	Fishing	Fishing	C	
a. Nane Branch	W	N	Fishing	Fishing	C	
b. Morgan Branch	W	N	Fishing	Fishing	C	
10. Church Branch	W	N	Fishing	Fishing	C	
11. Moore Branch	W	N	Fishing	Fishing	C	
12. Moss Branch	W	N	Fishing	Fishing	C	
13. Sunday Branch	WF	N	Fishing	Fishing	C	
14. Peckerwood Branch	WF	N	Fishing	Fishing	C	
a. Sapsucker Branch	W	N	Fishing	Fishing	C	
15. Johnson Mill Creek	WF	N	Fishing	Fishing	C	
a. West Prong	W	N	Fishing	Fishing	C	
(1) Snake Branch	W	N	Fishing	Fishing	C	
b. Shoal Branch	W	N	Fishing	Fishing	C	
c. Evans Branch	W	N	Fishing	Fishing	C	
d. Shearer Creek	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
(1) Little Shearer Creek	W	N	Fishing	Fishing	C	
16. Schoolhouse Branch	W	N	Fishing	Fishing	C	
17. Austin Branch	W	N	Fishing	Fishing	C	
18. Buckner Branch	W	N	Fishing	Fishing	C	
19. Bristol Branch	W	N	Fishing	Fishing	C	
20. Lyon Branch	WF	N	Fishing	Fishing	C	
21. Greasy Creek	WF	N	Fishing	Fishing	C	
G. Carver Creek	W	N	Fishing	Fishing	C	
H. Bob Branch	W	N	Fishing	Fishing	C	
I. Allbone Branch	W	N	Fishing	Fishing	C	
1. Old House Branch	W	N	Fishing	Fishing	C	
a. Stillhouse Branch	W	N	Fishing	Fishing	C	
J. Mob Branch	W	N	Fishing	Fishing	C	
K. Logan Cove Branch	W	N	Fishing	Fishing	C	
L. Fires Creek	W	N	Fishing	Fishing	C	Trout Waters
1. Far Bald Spring Branch	W	N	Fishing	Fishing	C	
2. Potrock Branch	W	N	Fishing	Fishing	C	
3. Bald Spring Branch	W	N	Fishing	Fishing	C	
4. Long Branch	W	N	Fishing	Fishing	C	
a. Short Branch	W	N	Fishing	Fishing	C	
b. Collett Camp Branch	W	N	Fishing	Fishing	C	
c. Coldspring Branch	W	N	Fishing	Fishing	C	
(1) Tatham Cabin Branch	W	N	Fishing	Fishing	C	
5. Flintspring Branch	W	N	Fishing	Fishing	C	
a. Ketron Camp Branch	W	N	Fishing	Fishing	C	
6. Rocky Cove Branch	W	N	Fishing	Fishing	C	
7. Little Fires Creek	W	N	Fishing	Fishing	C	
8. Wheeler Branch	W	N	Fishing	Fishing	C	
9. Wolfpen Branch	W	N	Fishing	Fishing	C	
10. Rockhouse Creek	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
a. Game Branch	W	N	Fishing	Fishing	C	
b. Laurel Creek	W	N	Fishing	Fishing	C	
(1) Rogues Branch	W	N	Fishing	Fishing	C	
(2) Messer Branch	W	N	Fishing	Fishing	C	
(3) Haigler Camp Branch	W	N	Fishing	Fishing	C	
(4) Hickory Cove Creek	W	N	Fishing	Fishing	C	
11. Letherwood Branch	W	N	Fishing	Fishing	C	
12. Huskins Branch	W	N	Fishing	Fishing	C	
13. Ledford Branch	W	N	Fishing	Fishing	C	
M. Passmore Branch	W	N	Fishing	Fishing	C	
N. Watson Branch	W	N	Fishing	Fishing	C	
O. Curtis Branch	W	N	Fishing	Fishing	C	
1. Betty Branch	W	N	Fishing	Fishing	C	
P. Carver Branch	WF	N	Fishing	Fishing	C	
Q. Sweetwater Creek	W	N	Fishing	Fishing	C	
R. Auberry Branch	W	N	Fishing	Fishing	C	
S. Anderson Branch	W	N	Fishing	Fishing	C	
T. Rocky Branch	W	N	Fishing	Fishing	C	
III. Hiwassee River from Andrews Dam to Town of Murphy Raw Water Intake.**	WF	N	WS	WS	A-II	Murphy Watershed
A. Carrell Branch	WF	N	Fishing	Fishing	C	
B. Calhoun Branch	WF	N	Fishing	Fishing	C	
C. Sudderth Branch	WF	N	Fishing	Fishing	C	
D. Suddawig Branch	WF	N	Fishing	Fishing	C	
E. Mission Branch	WF	N	Fishing	Fishing	C	
F. Brasstown Creek from North Carolina-Georgia State line.	WF	N	Fishing	Fishing	C	
1. Crawford Creek	WF	N	Fishing	Fishing	C	
a. Webb Creek	WF	N	Fishing	Fishing	C	
b. Long Branch	WF	N	Fishing	Fishing	C	

** All tributaries to segments of Hiwassee River classified "A-II" will be classified "C" unless otherwise noted.

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
c. Walker Branch	WF	N	Fishing	Fishing	C	
2. Beach Creek	WF	N	Fishing	Fishing	C	
3. Winchester Creek to North Carolina-Georgia State line.	WF	N	Fishing	Fishing	C	
4. Gumlog Creek to North Carolina-Georgia State line.	WF	N	Fishing	Fishing	C	
5. Trout Cove Branch	WF	N	Fishing	Fishing	C	
6. Pinelog Creek	WF	N	Fishing	Fishing	C	
a. Russell Branch to North Carolina-Georgia State line.	WF	N	Fishing	Fishing	C	
b. Clabber Branch	WF	N	Fishing	Fishing	C	
7. Payne Branch	WF	N	Fishing	Fishing	C	
8. Will Mason Branch	WF	N	Fishing	Fishing	C	
9. Greasy Creek	WF	N	Fishing	Fishing	C	
10. Buchanan Branch	WF	N	Fishing	Fishing	C	
11. Little Brasstown Creek	WF	N	Fishing	Fishing	C	
a. Pinhook Branch	WF	N	Fishing	Fishing	C	
(1) Stamey Branch	WF	N	Fishing	Fishing	C	
(2) John Mason Branch	WF	N	Fishing	Fishing	C	
b. Ricks Branch	WF	N	Fishing	Fishing	C	
(1) Frankum Branch	WF	N	Fishing	Fishing	C	
c. Tweed Branch	WF	N	Fishing	Fishing	C	
d. Clayton Branch	WF	N	Fishing	Fishing	C	
e. Garringer Branch	WF	N	Fishing	Fishing	C	
f. Brendle Branch	WF	N	Fishing	Fishing	C	
(1) Bevins Branch	WF	N	Fishing	Fishing	C	
12. Jenkins Branch	WF	N	Fishing	Fishing	C	
13. Donaldson Branch	WF	N	Fishing	Fishing	C	
G. M^c^Comb Branch	WF	N	Agri.	Agri.	D	Effluent from N.C. Prison Unit #141 sewage treatment plant.

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
H. Peachtree Creek	WF	N	Fishing	Fishing	C	Effluent from Peachtree school sewage treatment plant.
1. Coldspring Branch	W	N	Fishing	Fishing	C	
2. Panther Branch	W	N	Fishing	Fishing	C	
3. Painter Branch	W	N	Fishing	Fishing	C	
4. Fate Puett Cove Creek	WF	N	Fishing	Fishing	C	
a. Burl Branch	WF	N	Fishing	Fishing	C	
b. Truett Branch	WF	N	Fishing	Fishing	C	
5. Lamb Branch	WF	N	Fishing	Fishing	C	
6. Elliott Branch	WF	N	Fishing	Fishing	C	
7. Pipes Branch	WF	N	Fishing	Fishing	C	
a. Mill Branch	WF	N	Fishing	Fishing	C	
b. Gregory Branch	WF	N	Fishing	Fishing	C	
8. Moody Branch	WF	N	Fishing	Fishing	C	
9. Slow Creek	WF	N	Fishing	Fishing	C	
a. Barnett Branch	WF	N	Fishing	Fishing	C	
b. Messer Branch	WF	N	Fishing	Fishing	C	
c. Graham Branch	WF	N	Fishing	Fishing	C	
d. Snead Branch	WF	N	Fishing	Fishing	C	
(1) Cornwell Branch	WF	N	Fishing	Fishing	C	
I. Fall Branch	WF	N	Fishing	Fishing	C	
1. Seibold Branch	WF	N	Fishing	Fishing	C	
J. Burnthouse Branch	W	N	Fishing	Fishing	C	
K. Will Scott Creek	WF	N	Fishing	Fishing	C	
L. Hampton Creek	WF	N	Fishing	Fishing	C	
1. Harshaw Branch	WF	N	Fishing	Fishing	C	
2. Campground Branch	WF	N	Fishing	Fishing	C	
M. Martin Creek	WF	N	Fishing	Fishing	C	Effluent from Martin Creek school sewage treatment plant.

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
1. Mag Ash Branch	WF	N	Fishing	Fishing	C	
2. George Creek	WF	N	Fishing	Fishing	C	
3. Right Prong	WF	N	Fishing	Fishing	C	
IV. Hiwassee River (Hiwassee Lake below Elev. 1526) from Town of Murphy Raw Water Intake to mouth of Laurel Creek.	WF&HDA	P	WD	Fishing	C	D.S. from Town of Murphy.
A. Valley River	WF&PA	N-P	Fishing	Fishing	C	Trout Waters. D.S. from Towns of Andrews and Murphy and effluent from Murphy High School sewage treatment plant.
1. Powder Burnt Branch	W	N	Fishing	Fishing	C	
2. Long Branch	W	N	Fishing	Fishing	C	
3. Wright Branch	W	N	Fishing	Fishing	C	
4. East Nelson Creek	WF	N	Fishing	Fishing	C	
5. West Nelson Creek	WF	N	Fishing	Fishing	C	
6. Watkins Creek	W	N	Fishing	Fishing	C	
a. Beetree Branch	W	N	Fishing	Fishing	C	
7. Millseat Branch	W	N	Fishing	Fishing	C	
8. Bent Creek	W	N	Fishing	Fishing	C	
9. Bryson Branch	W	N	Fishing	Fishing	C	
10. Brady Branch	W	N	Fishing	Fishing	C	
11. Tank Branch	W	N	Fishing	Fishing	C	
a. Silvermine Branch	W	N	Fishing	Fishing	C	
12. Mill Branch	W	N	Fishing	Fishing	C	
13. Turnpike Creek	W	N	Fishing	Fishing	C	
a. Totherrow Branch	W	N	Fishing	Fishing	C	
14. Harris Creek	W	N	Fishing	Fishing	C	
a. Granny Squirrel Branch	W	N	Fishing	Fishing	C	
15. Melton Creek	W	N	Fishing	Fishing	C	
a. Fine Comb Branch	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
16. Doctor Branch	W	N	Fishing	Fishing	C	
17. Tom Thumb Creek	W	N	Fishing	Fishing	C	
18. Puncheon Branch	W	N	Fishing	Fishing	C	
19. Stillhouse Branch	W	N	Fishing	Fishing	C	
20. Flat Branch	W	N	Fishing	Fishing	C	
21. Mill Branch	W	N	Fishing	Fishing	C	
22. Burnt Shanty Branch	W	N	Fishing	Fishing	C	
23. Gipp Creek	W	N	Fishing	Fishing	C	
a. Brokeleg Branch	W	N	Fishing	Fishing	C	
b. Ash Cove Creek	W	N	Fishing	Fishing	C	
24. Worm Creek	WF	N	Fishing	Fishing	C	
a. Matherson Creek	W	N	Fishing	Fishing	C	
b. Radder Creek	W	N	Fishing	Fishing	C	
(1) Nick Branch	W	N	Fishing	Fishing	C	
(2) Coefield Branch	W	N	Fishing	Fishing	C	
c. Kennedy Creek	W	N	Fishing	Fishing	C	
d. Shop Branch	WF	N	Fishing	Fishing	C	
e. Ingram Branch	WF	N	Fishing	Fishing	C	
(1) Rail Cove Branch	WF	N	Fishing	Fishing	C	
25. Junaluska Creek	WF	N	Fishing	Fishing	C	Trout Waters
a. Bob Allen Branch	W	N	Fishing	Fishing	C	
b. Hogan Branch	W	N	Fishing	Fishing	C	
c. White Branch	W	N	Fishing	Fishing	C	
d. Schoolhouse Branch	W	N	Fishing	Fishing	C	
e. Hicks Branch	W	N	Fishing	Fishing	C	
f. Ashturn Creek	W	N	Fishing	Fishing	C	
(1) Catstair Branch	W	N	Fishing	Fishing	C	
g. Patterson Branch	W	N	Fishing	Fishing	C	
h. Culbert Branch	W	N	Fishing	Fishing	C	
i. Polecat Branch	W	N	Fishing	Fishing	C	
j. Bear Branch	W	N	Fishing	Fishing	C	
(1) Right Fork	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
k. Weaver Branch	W	N	Fishing	Fishing	C	
l. Bolden Branch	W	N	Fishing	Fishing	C	
26. Stewart Branch	WF	N	Fishing	Fishing	C	
a. Mary Branch	W	N	Fishing	Fishing	C	
27. Pile Creek	W	N	Fishing	Fishing	C	
a. Turkeypen Branch	W	N	Fishing	Fishing	C	
b. Spread Eagle Branch	W	N	Fishing	Fishing	C	
28. Tatham Creek	WF&PA	N-P	Agri.	Agri.	D	D.S. from Town of Andrews.
a. McClellan Creek	WF	N	Fishing	Fishing	C	
(1) Trail Branch	W	N	Fishing	Fishing	C	
(a) Polecat Branch	W	N	Fishing	Fishing	C	
(b) Coefield Branch	W	N	Fishing	Fishing	C	
(2) Snyder Creek	W	N	Fishing	Fishing	C	
b. Collett Creek	WF	N	Fishing	Fishing	C	
(1) Flat Branch	W	N	Fishing	Fishing	C	
(2) Crawford Branch	W	N	Fishing	Fishing	C	
c. Phillips Creek	W	N	Fishing	Fishing	C	
29. Britton Creek to proposed Andrews water supply intake.	W	N	Fishing	WS	A-I	Proposed Andrews Watershed.
30. Britton Creek from proposed Andrews water supply intake to mouth.	WF	N	Fishing	Fishing	C	
31. Beaver Creek to Andrews water supply intake.	W	N	WS	WS	A-I	Andrews Watershed.
a. Freeman Branch	W	N	WS	WS	A-I	Andrews Watershed.
32. Beaver Creek from Andrews water supply intake to mouth.	WF	N	Fishing	Fishing	C	
a. Bob Branch	WF	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
b. Dan Holland Creek to proposed Andrews water supply intake.	W	N	Fishing	WS	A-I	Proposed Andrews watershed.
c. Dan Holland Creek from proposed Andrews water supply intake to mouth.	WF	N	Fishing	Fishing	C	
(1) Sunk Branch	W	N	Fishing	Fishing	C	
(2) Big Cove Branch	W	N	Fishing	Fishing	C	
(a) Strange Branch	W	N	Fishing	Fishing	C	
33. Town Branch	PA	SP	Drainage	Drainage	D	Drainage from Town of Andrews.
34. Webb Creek	W	N	Fishing	Fishing	C	
a. Left Fork	W	N	Fishing	Fishing	C	
b. Right Fork	W	N	Fishing	Fishing	C	
(1) Beach Branch	W	N	Fishing	Fishing	C	
c. Moody Branch	W	N	Fishing	Fishing	C	
d. Underwood Branch	W	N	Fishing	Fishing	C	
35. Whitaker Creek	WF	N	Agri.	Agri.	D	
36. Brown Creek	WF	N	Fishing	Fishing	C	
37. Ricket Branch	WF	N	Fishing	Fishing	C	
a. Jones Branch	WF	N	Fishing	Fishing	C	
38. Morris Creek	WF	N	Fishing	Fishing	C	
a. Cozad Branch	W	N	Fishing	Fishing	C	
b. Mike Branch	W	N	Fishing	Fishing	C	
c. Truett Branch	W	N	Fishing	Fishing	C	
d. Allmon Branch	WF	N	Fishing	Fishing	C	
e. Bryson Branch	W	N	Fishing	Fishing	C	
39. Sharp Branch	WF	N	Fishing	Fishing	C	
40. Thrash Creek	WF	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Pro-posed Class	Comments
41. Taylor Creek	WF	N	Fishing	Fishing	C	
a. Gumflats Creek	WF	N	Fishing	Fishing	C	
(1) Colvard Creek	W	N	Fishing	Fishing	C	
b. Alfred Creek	W	N	Fishing	Fishing	C	
c. Aaron Creek	W	N	Fishing	Fishing	C	
d. Hogpen Branch	W	N	Fishing	Fishing	C	
e. Tom Branch	WF	N	Fishing	Fishing	C	
f. Luther Branch	WF	N	Fishing	Fishing	C	
42. Welch Mill Creek	WF	N	Fishing	Fishing	C	
a. Hurricane Branch	W	N	Fishing	Fishing	C	
b. Griggs Branch	W	N	Fishing	Fishing	C	
c. Townhouse Creek	WF	N	Fishing	Fishing	C	
43. Parker Branch	WF	N	Agri.	Agri.	D	
44. Laurel Branch	WF	N	Agri.	Agri.	D	
a. Burnt Branch	WF	N	Agri.	Agri.	D	
45. Hyatt Creek	WF	N	Fishing	Fishing	C	
a. Little Dam Branch	W	N	Fishing	Fishing	C	
b. Big Dam Branch	W	N	Fishing	Fishing	C	
(1) Pounding Mill Branch	W	N	Fishing	Fishing	C	
c. Slickrock Branch	W	N	Fishing	Fishing	C	
(1) Moss Branch	W	N	Fishing	Fishing	C	
d. Fishermare Branch	W	N	Fishing	Fishing	C	
e. Allmon Creek	W	N	Fishing	Fishing	C	
46. Parsons Branch	WF	N	Fishing	Fishing	C	
a. Ladd Branch	WF	N	Fishing	Fishing	C	
47. Vengeance Creek	WF	N	Fishing	Fishing	C	
a. Coldspring Branch	W	N	Fishing	Fishing	C	
(1) Ramp Cove Branch	W	N	Fishing	Fishing	C	
b. Buckhorn Branch	W	N	Fishing	Fishing	C	
c. Graybeard Creek	WF	N	Fishing	Fishing	C	
(1) Nancy Hawkins Branch	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Pro-posed Class	Comments
(2) Jenick Branch	W	N	Fishing	Fishing	C	
d. Puett Creek	WF	N	Fishing	Fishing	C	
(1) Derreberry Branch	WF	N	Fishing	Fishing	C	
48. Highfalls Branch	W	N	Fishing	Fishing	C	
49. Bettis Branch	WF	N	Fishing	Fishing	C	
50. Rhea Branch	WF	N	Fishing	Fishing	C	
51. Magazine Branch	W	N	Agri.	Agri.	D	
52. Mason Branch	WF	N	Agri.	Agri.	D	
53. Sam Branch	WF	N	Agri.	Agri.	D	
54. Stillhouse Branch	WF	N	Agri.	Agri.	D	
55. Long Branch	WF	N	Fishing	Fishing	C	
56. Pole Bridge Branch	WF	N	Agri.	Agri.	D	
57. Sam Newton Branch	WF	N	Agri.	Agri.	D	
58. Morgan Creek	W	N	Fishing	Fishing	C	
a. Highfall Branch	W	N	Fishing	Fishing	C	
b. Wilson Branch	W	N	Fishing	Fishing	C	
c. Cindy Branch	WF	N	Fishing	Fishing	C	
d. Dick Branch	WF	N	Fishing	Fishing	C	
e. Simon Branch	WF	N	Fishing	Fishing	C	
59. Mary Branch	WF	N	Fishing	Fishing	C	
60. Colvard Creek	W	N	Fishing	Fishing	C	
a. Sassafras Branch	W	N	Fishing	Fishing	C	
b. Gabby Branch	W	N	Fishing	Fishing	C	
c. Sawmill Branch	W	N	Fishing	Fishing	C	
d. Wagon Timber Branch	W	N	Fishing	Fishing	C	
e. Jackson Branch	W	N	Fishing	Fishing	C	
f. Cowmire Branch	W	N	Fishing	Fishing	C	
61. Hayes Mill Creek	W	N	Fishing	Fishing	C	
62. Rogers Creek	WF	N	Fishing	Fishing	C	
a. Pace Branch	WF	N	Fishing	Fishing	C	
(1) Chestnut Log Branch	WF	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
b. John Newton Branch	WF	N	Fishing	Fishing	C	
63. Keener Branch	WF	N	Fishing	Fishing	C	
a. Schoolhouse Branch	WF	N	Fishing	Fishing	C	
64. Sales Branch	WF	N	Fishing	Fishing	C	
65. Rattler Branch	WF	N	Fishing	Fishing	C	
66. George Martin Branch	W	N	Fishing	Fishing	C	
67. Wesley Martin Branch	W	N	Fishing	Fishing	C	
68. Marble Creek to Murphy water supply intake.	W	N	WS	WS	A-I	Murphy Watershed.
69. Marble Creek from Murphy water supply intake to mouth.	WF	N	Fishing	Fishing	C	
a. Brittian Creek to Murphy water supply intake.	W	N	WS	WS	A-I	Murphy Watershed.
b. Brittian Creek from Murphy water supply intake to mouth.	W	N	Fishing	Fishing	C	
70. Palmer Branch	W	N	Fishing	Fishing	C	
71. Brittian Branch	WF	N	Agri.	Agri.	D	
72. M^cColl Branch	HDA	GP	Drainage	Drainage	D	D.S. from Town of Murphy.
V. Hiwassee River (Hiwassee Lake below Elev. 1526) from mouth of Laurel Creek to mouth of Bearpaw Creek, excluding Nottely River Arm.	W	N-SP	Rec.	Rec.	B	
A. Laurel Creek	W	N	Fishing	Fishing	C	
B. Kirklin Creek	W	N	Fishing	Fishing	C	
C. Bates Creek	WF	N	Fishing	Fishing	C	
D. Hanging Dog Creek	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
1. Will Creek	W	N	Fishing	Fishing	C	
a. Woody Branch	W	N	Fishing	Fishing	C	
2. Augen Branch	W	N	Fishing	Fishing	C	
3. Grindstone Branch	W	N	Fishing	Fishing	C	
4. Davis Creek	WF	N	Fishing	Fishing	C	Trout Waters
a. Bald Creek	W	N	Fishing	Fishing	C	Trout Waters
b. Dockery Creek	W	N	Fishing	Fishing	C	
(1) Mose Creek	W	N	Fishing	Fishing	C	
(2) Gumlog Creek	W	N	Fishing	Fishing	C	
c. Little Creek	W	N	Fishing	Fishing	C	
(1) Rocky Knob Branch	W	N	Fishing	Fishing	C	
d. Snap Branch	W	N	Fishing	Fishing	C	
e. Cook Creek	W	N	Fishing	Fishing	C	
f. Owl Creek	W	N	Fishing	Fishing	C	
(1) Dinkin Cove Creek	W	N	Fishing	Fishing	C	
(2) Little Owl Creek	W	N	Fishing	Fishing	C	
g. Dockery Creek	WF	N	Fishing	Fishing	C	
(1) Rose Creek	W	N	Fishing	Fishing	C	
E. Nottely River from North Carolina-Georgia State Line to mouth.	WF	N	Fishing	Fishing	C	
1. Moccasin Creek (North Carolina portion)	WF	N	Fishing	Fishing	C	
2. Butler Creek from North Carolina-Georgia State Line.	WF	N	Fishing	Fishing	C	
3. Cobb Creek	WF	N	Fishing	Fishing	C	
a. Grape Thicket Branch	WF	N	Fishing	Fishing	C	
4. Gold Branch	WF	N	Agri.	Agri.	D	
5. Owenby Creek from North Carolina-Georgia State Line.	WF	N	Agri.	Agri.	D	
6. Rapier Mill Creek	WF	N	Agri.	Agri.	D	
a. South Fork (North Carolina portion)	WF	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
b. North Fork	WF	N	Fishing	Fishing	C	
(1) Garland Branch	WF	N	Fishing	Fishing	C	
7. Dickey Branch	WF	N	Agri.	Agri.	D	
8. Walker Mill Creek	WF	N	Agri.	Agri.	D	
9. Rominger Creek	WF	N	Agri.	Agri.	D	
10. Cane Creek	WF	N	Fishing	Fishing	C	
a. Lindsey Branch	WF	N	Fishing	Fishing	C	
(1) Stillhouse Branch	W	N	Fishing	Fishing	C	
b. Crane Creek	WF	N	Fishing	Fishing	C	
11. Sneed Branch	W	N	Fishing	Fishing	C	
12. Laurel Branch	W	N	Fishing	Fishing	C	
F. Beech Creek	W	N	Fishing	Fishing	C	
G. Grape Creek	WF	N	Fishing	Fishing	C	
1. West Prong	WF	N	Fishing	Fishing	C	
H. Song Branch	WF	N	Fishing	Fishing	C	
I. Jack Davis Branch	W	N	Fishing	Fishing	C	
J. Persimmon Creek	WF	N	Fishing	Fishing	C	
1. Flax Creek	WF	N	Fishing	Fishing	C	
2. Hickey Branch	WF	N	Fishing	Fishing	C	
K. Hibbert Branch	W	N	Fishing	Fishing	C	
VI. Hiwassee River (Hiwassee Lake below Elev. 1526) from mouth of Bearpaw Creek to Hiwassee Dam.**	W	N	WS	WS	A-II	Hiwassee Resort Village Watershed.
A. Bearpaw Creek	WF	N	Fishing	Fishing	C	
B. Hyatt Mill Creek	W	N	Fishing	Fishing	C	
C. Taylor Branch	WF	N	Agri.	Agri.	D	
D. Johnson Creek	WF	N	Agri.	Agri.	D	
E. Chambers Creek	W	N	Fishing	Fishing	C	
F. Powell Branch	W	N	Fishing	Fishing	C	
G. Beaverdam Creek	WF	N	Fishing	Fishing	C	
1. Horton Branch	W	N	Fishing	Fishing	C	

** All tributaries to segments of Hiwassee River classified "A-II" will be classified "C" unless otherwise noted.

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
2. Radford Branch	W	N	Fishing	Fishing	C	
3. Cook Creek	WF	N	Fishing	Fishing	C	
a. Farmer Branch	W	N	Fishing	Fishing	C	
(1) Roberts Branch	W	N	Fishing	Fishing	C	
b. Garrett Creek	W	N	Fishing	Fishing	C	
(1) Bell Creek	W	N	Fishing	Fishing	C	
4. Copper Creek	W	N	Fishing	Fishing	C	Trout Waters
a. Kilby Branch	W	N	Fishing	Fishing	C	
(1) Miller Branch	W	N	Fishing	Fishing	C	
b. Groundhog Branch	W	N	Fishing	Fishing	C	
c. Pot Log Branch	W	N	Fishing	Fishing	C	
d. Cindy Branch	W	N	Fishing	Fishing	C	
e. Buckhorn Creek	W	N	Fishing	Fishing	C	
5. Bryson Branch	WF	N	Fishing	Fishing	C	
6. Bryson Creek	WF	N	Fishing	Fishing	C	
H. Moccasin Creek	WF	N	Fishing	Fishing	C	
VII. Hiwassee River (Apalachia Lake below Elev. 1281) from Hiwassee Dam to mouth of Anderson Creek.	W&PA	SP	Fishing	Fishing	C	Effluent from Hiwassee Resort Village sewage treatment plant.
VIII. Hiwassee River (Apalachia Lake below Elev. 1281) from mouth of Anderson Creek to mouth of North Shoal Creek.	W	N	Rec.	Rec.	B	
A. Anderson Creek	W	N	Fishing	Fishing	C	
B. South Shoal Creek	WF	N	Fishing	Fishing	C	
1. Allen Branch	WF	N	Fishing	Fishing	C	
2. Thompson Branch	WF	N	Fishing	Fishing	C	Effluent from Hiwassee Dam School sewage treatment plant.
3. Quinn Creek	WF	N	Fishing	Fishing	C	
C. Little Shoal Creek	W	N	Fishing	Fishing	C	

TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
D. Beavers Branch	WF	N	Fishing	Fishing	C	
IX. Hiwassee River (Apalachia Lake below Elev. 1281) from mouth of North Shoal Creek to Apalachia Dam.**	W	N	WS	WS	A-II	Apalachia Dam Powerhouse Watershed (via penstock)
A. North Shoal Creek	WF	N	Fishing	Fishing	C	
1. Potter Branch	W	N	Fishing	Fishing	C	
B. Baine Branch	W	N	Fishing	Fishing	C	
C. Camp Creek	WF	N	Fishing	Fishing	C	
D. Adams Branch	WF	N	Fishing	Fishing	C	
E. Laurel Branch from North Carolina-Tennessee State Line.	WF	N	Fishing	Fishing	C	
X. Hiwassee River from Apalachia Dam to North Carolina-Tennessee State Line.	W	N	Fishing	Fishing	C	
A. Shuler Creek	WF	N	Fishing	Fishing	C	
1. Bear Branch	W	N	Fishing	Fishing	C	
2. Floyde Branch	W	N	Fishing	Fishing	C	
3. Locust Gap Branch	W	N	Fishing	Fishing	C	
4. Pretty Pine Branch	W	N	Fishing	Fishing	C	
5. Buckberry Branch	W	N	Fishing	Fishing	C	
6. Morrow Branch	W	N	Fishing	Fishing	C	
7. Elbow Branch	W	N	Fishing	Fishing	C	
8. Slate Creek	W	N	Fishing	Fishing	C	
9. Flat Branch	W	N	Fishing	Fishing	C	
B. Brushy Creek to North Carolina-Tennessee State Line.	W	N	Fishing	Fishing	C	
C. Rocky Ford Creek to North Carolina-Tennessee State Line.(1)	WF	N	Fishing	Fishing	C	
D. Hall Creek to North Carolina-Tennessee State Line.(1)	W	N	Fishing	Fishing	C	

** All tributaries to segments of Hiwassee River classified "A-II" will be classified "C" unless otherwise noted.

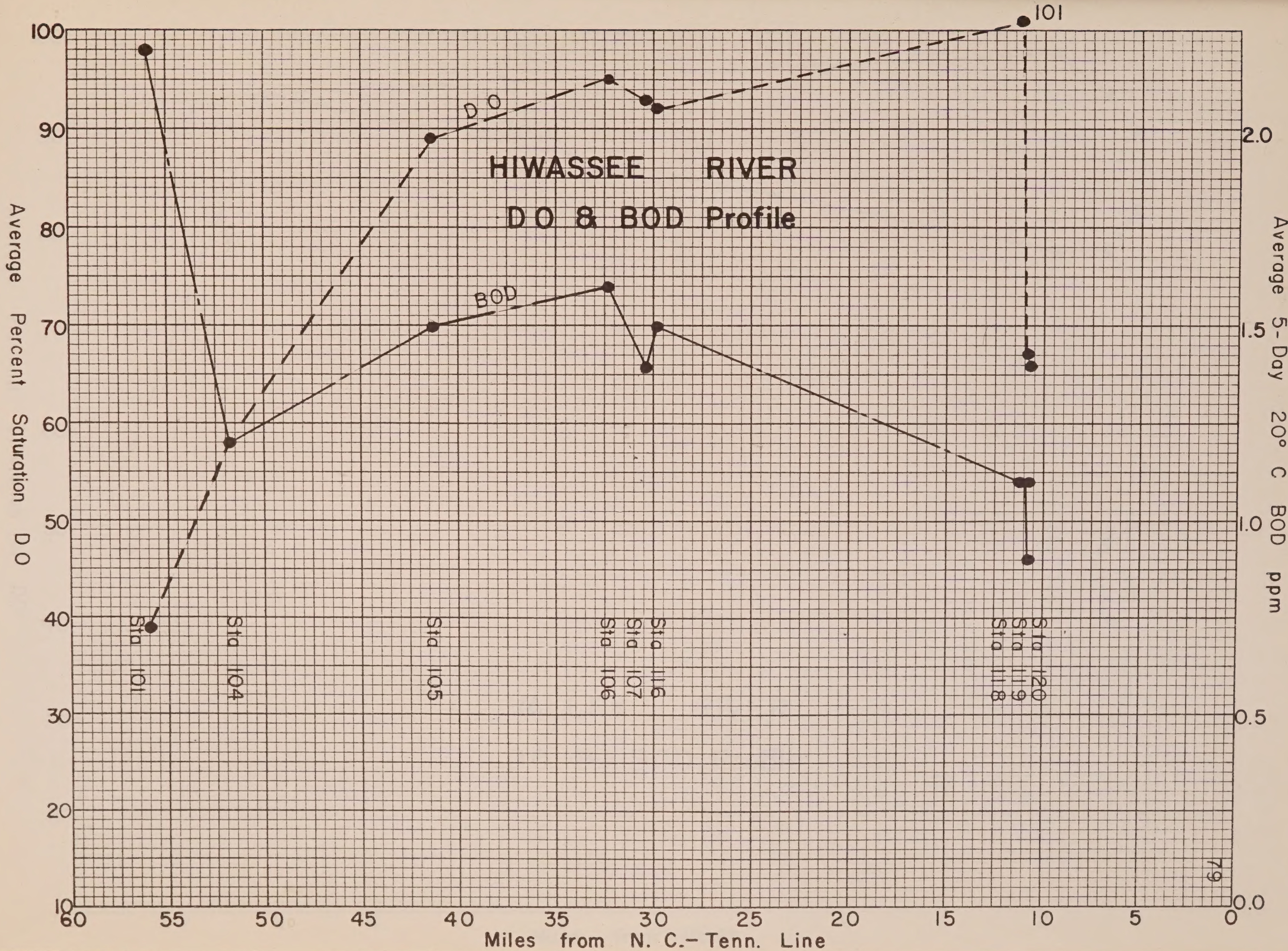
TABLE 8
RECOMMENDED CLASSIFICATIONS
HIWASSEE RIVER BASIN

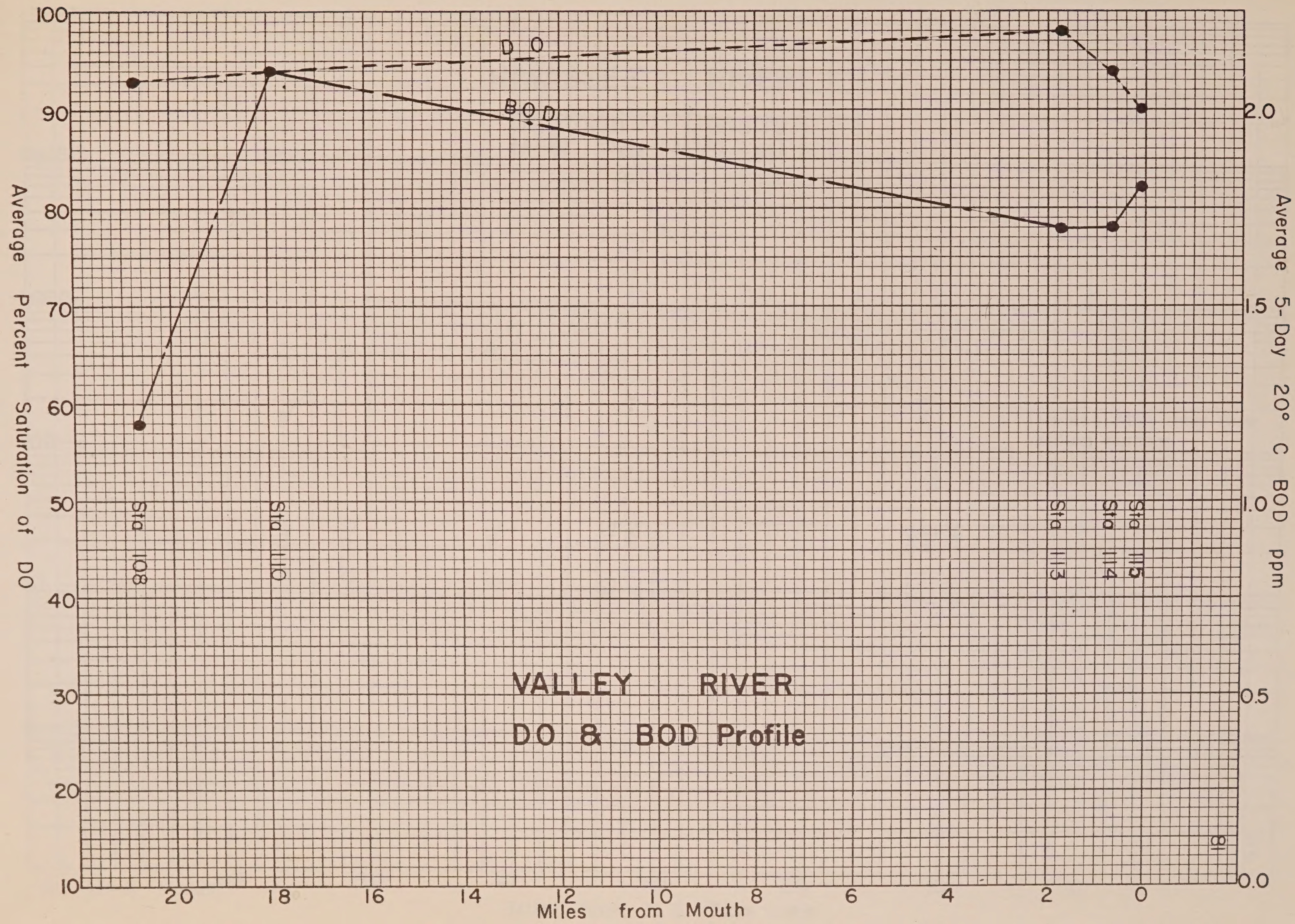
Streams*	Character of District	Condition of Waters	Chief Present Usage	Best Usage	Proposed Class	Comments
E. Hothouse Creek to North Carolina-Georgia State Line.(2)	WF	N	Fishing	Fishing	C	
1. Long Branch	WF	N	Fishing	Fishing	C	
2. Synacia Creek to North Carolina-Georgia State Line.	WF	N	Fishing	Fishing	C	
F. Wolf Creek to North Carolina-Georgia State Line.(2)	WF	N	Fishing	Fishing	C	
G. Potato Creek to North Carolina-Tennessee State Line.(3)	W	N	Fishing	Fishing	C	
1. North Potato Creek to North Carolina-Tennessee State Line.	W	N	Fishing	Fishing	C	

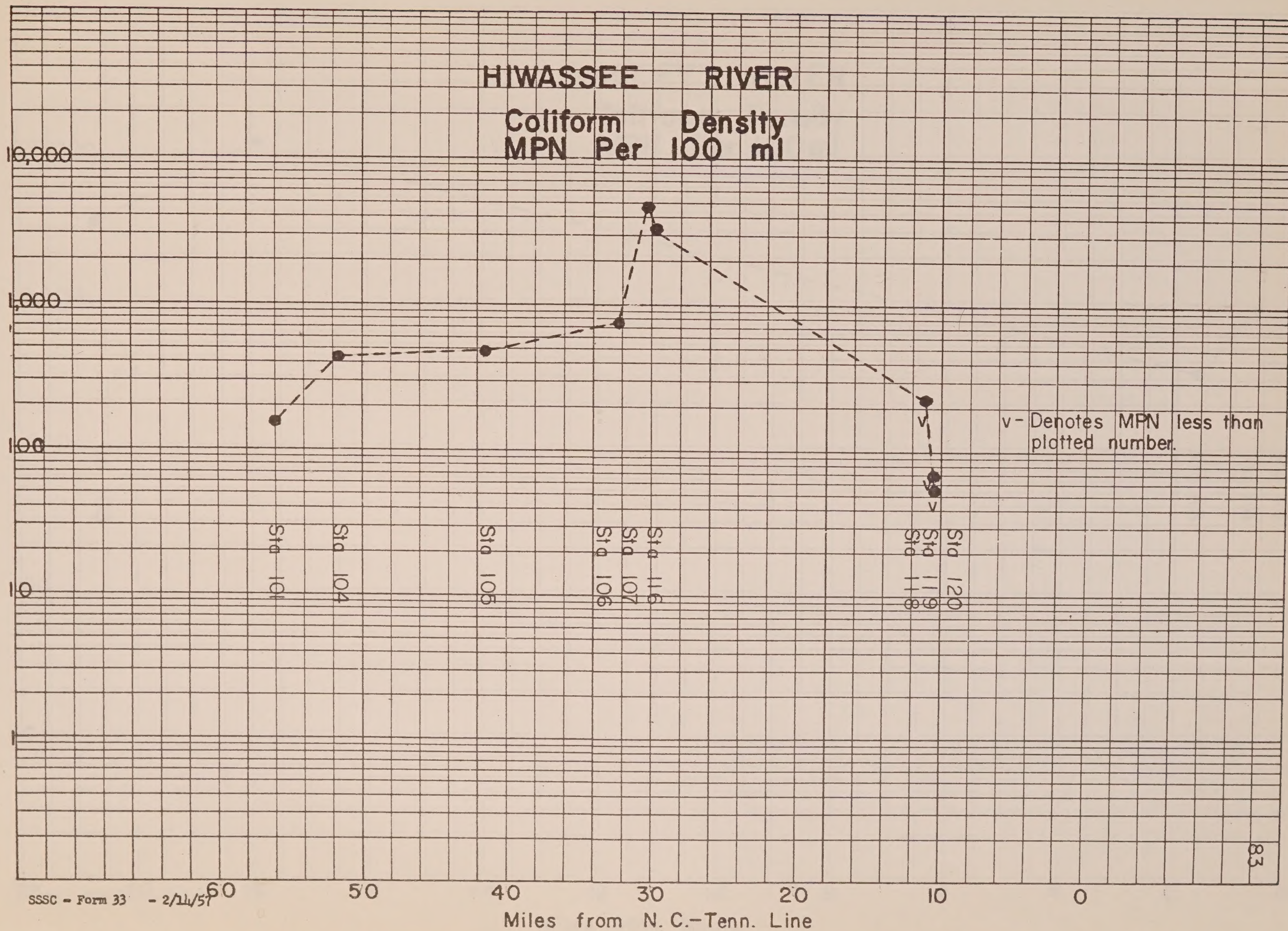
(1) Tributary to Turtletown Creek to Hiwassee River in Tennessee.

(2) Tributary to Toccoa River to Ocoee River to Hiwassee River in Tennessee.

(3) Tributary to Ocoee River to Hiwassee River in Tennessee.


HIWASSEE RIVER
DO & BOD Profile
D O
BOD
101
Sta 101
Sta 104
Sta 105
Sta 106
Sta 107
Sta 116
Sta 118
Sta 119
Sta 120
Average Percent Saturation DO
Average 5-Day 20° C BOD ppm
Miles from N. C.- Tenn. Line
79


Average Percent Saturation of DO
100
90
80
70
60
50
40
30
20
10
Average 5-Day 20° C BOD ppm
2.0
1.5
1.0
0.5
0.0
D O
B O D
Sta 108
Sta 110
Sta 113
Sta 114
Sta 115
VALLEY RIVER
DO & BOD Profile
20
18
16
14
12
10
8
6
4
2
0
Miles from Mouth



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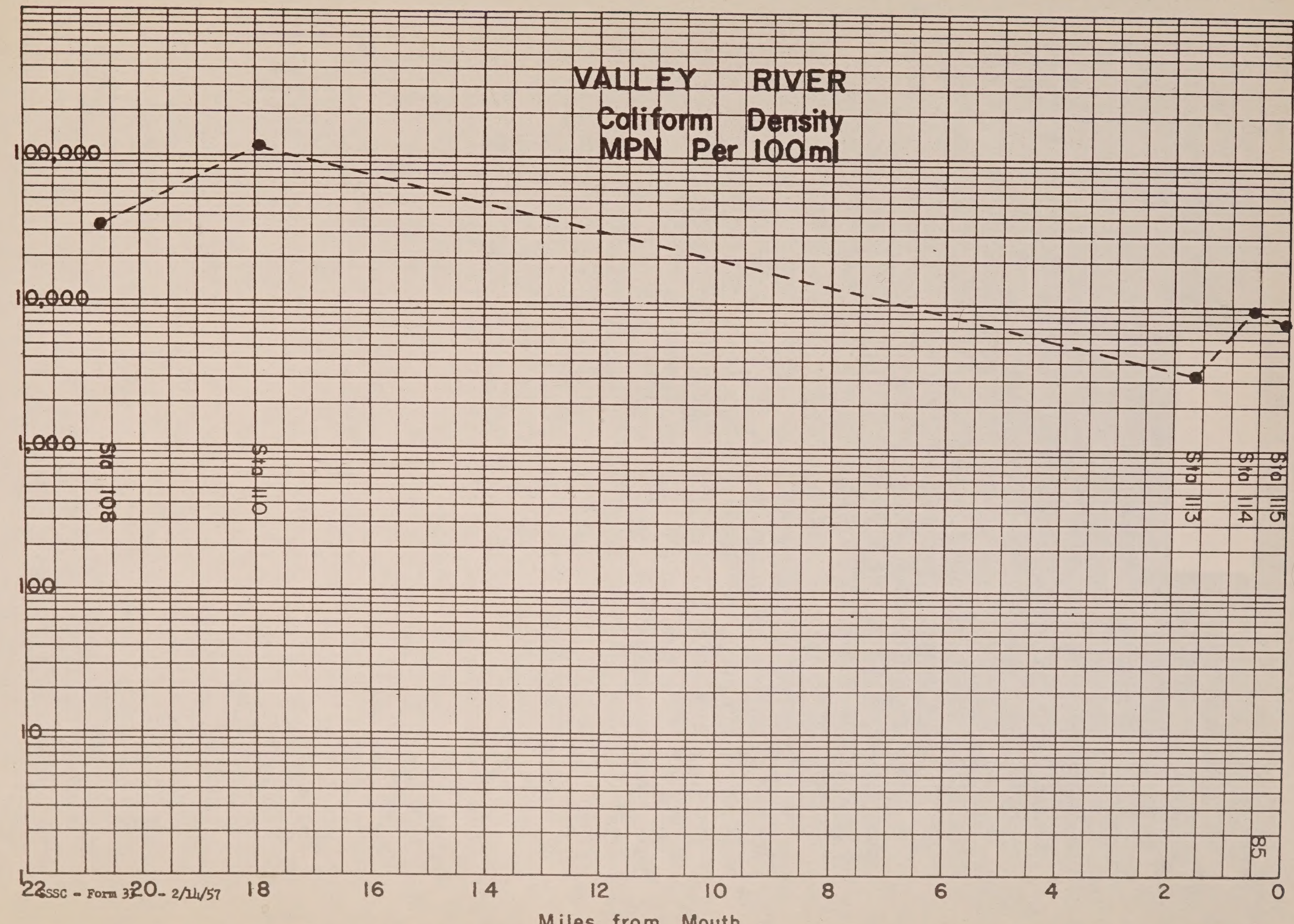

VALLEY RIVER
Coliform Density
MPN Per 100ml
100,000
10,000
1,000
100
10
1
Sta 108
Sta 110
Sta 113
Sta 114
Sta 115
85
22
20
18
16
14
12
10
8
6
4
2
0
Miles from Mouth
SSC - Form 33 2/14/57